INDEX NUMBER

Vol. 22. No. 12 DECEMBER, 1924

THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS REVIEW

Entered as second class matter February 10, 1903, at the post office at New York under the Act of 1879.

A MONTHLY PUBLICATION RELATING TO THE METAL AND PLATING TRADES

SUBSCRIPTION PRICE PER YEAR, UNITED STATES AND CANADA, ONE DOLLAR; OTHER COUNTRIES, TWO DOLLARS. THE METAL INDUSTRY PUBLISHING COMPANY, 99 JOHN STREET, NEW YORK, U. S. A.

Contents Page 493

EGYPTIAN

FOUR thousand years ago "all that glittered was not gold." Egyptian Lacquers, used as a medium for applying imitation gold, were of such quality that the deception was complete.

* * * * *

TO-DAY Egyptian Bronze Mediums are of that same superior quality, and are extensively used in the application of bronze powders.

* * * * *

Send for Booklet
Bronze Powder and Enamel Finishes

The Egyptian Lacquer Mfg. Co.
90 West Street, New York

LACQUERS

THE
METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS REVIEW

VOL. 22 NEW YORK, DECEMBER, 1924 No. 12

The Michigan Copper and Brass Company

A Record of the Growth and Expansion of One of the Early Mills Located in the Middle West*

Written for The Metal Industry by A. MILLMAN

Back in the early part of 1906 The Michigan Copper and Brass Company was originally incorporated. George H. Barbour was President; F. T. Moran, Vice-President, and N. D. Carpenter, Treasurer.

In July of the following year the mill turned out its first product and started out in its modest way to make a bid for its place in the brass industry. Only $400,000 had been put into the venture, so for size, the mills were rather insignificant as compared with the older mills, particularly those in the East.

At that time Detroit was thought of as being "way out West." Michigan was a long way from the Naugatuck Valley where the brass industry had its birth in this country and where metal of a known quality had been made for several generations. For that reason the new company had a rather hard period of pioneering, away from the beaten trail of the brass business in the East, and away from the real consumers of brass and copper who had established themselves, quite naturally, in close proximity to the mills.

But the founders of the business were men of broad vision and far-sighted business instinct. They were, for the most part, men who had come out of the East in their earlier days and founded business enterprises, some of which had grown to be the very largest in the world. They had viewed at close range for many years the tremendous growth of the Middle West, and they had faith in its future as applied to the brass and copper business.

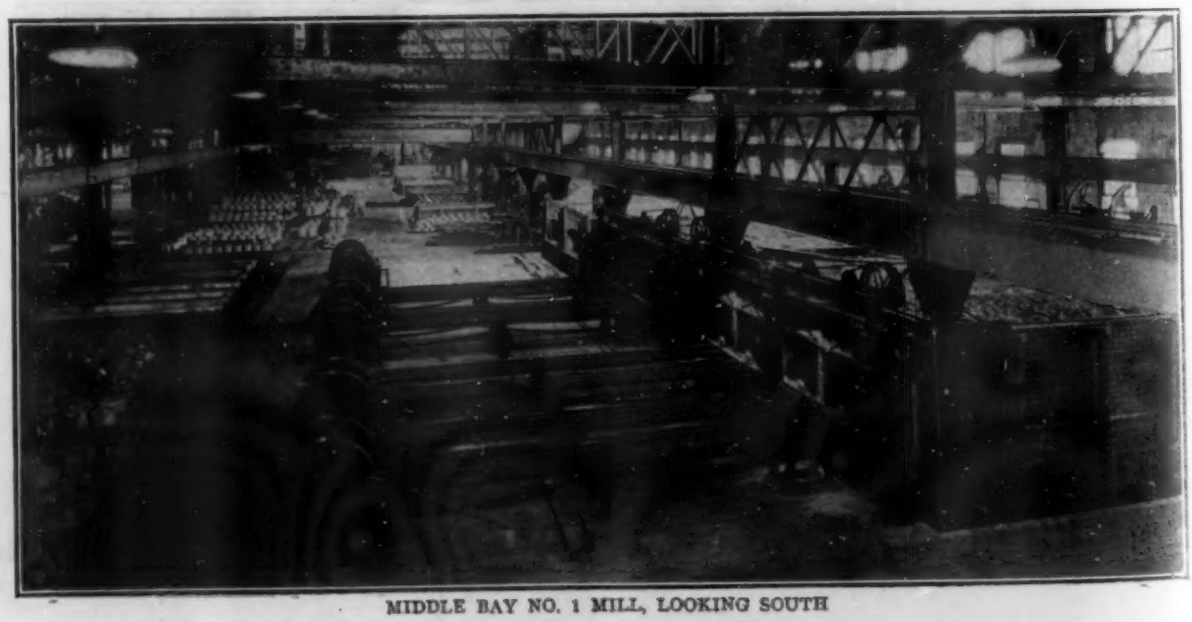
And so while the mills themselves at the start were small, enough land was bought to take care of future growth. A tract of fourteen acres, one of the finest pieces of manufacturing property in the City of Detroit, was bought, with Michigan Central Railway connection on one side and the Detroit River on the other. Also, the mills and equipment, though small, were built with success and not failure in mind. Hugh L. Thompson of Waterbury, Conn., admittedly one of the very ablest construction engineers in the country, was employed to supervise the

*See THE METAL INDUSTRY for an article describing this mill in October, 1908.

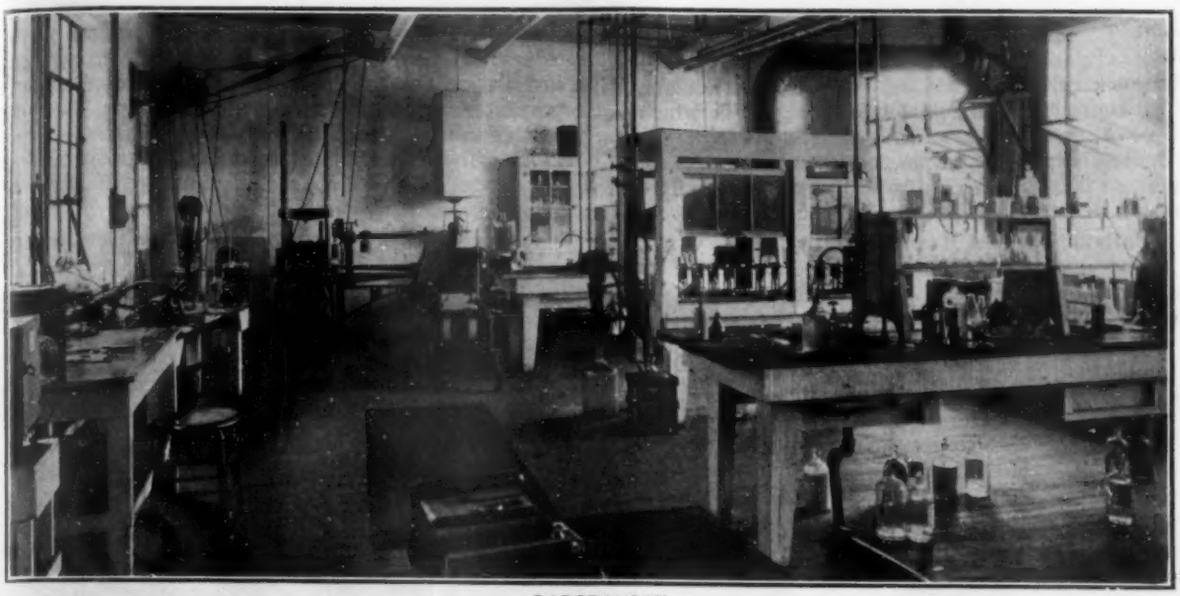
CASTING SHOP—AJAX FURNACE DEPARTMENT

ROD MILL

WEST SIDE NO. 1 MILL, LOOKING NORTH



MIDDLE BAY NO. 1 MILL, LOOKING SOUTH



LABORATORY

EAST SIDE THIN METAL MILL, LOOKING SOUTH

WEST SIDE THIN METAL MILL, LOOKING NORTH

erection of the buildings and the installation of the equipment.

Thus when the great Middle West, and particularly the City of Detroit, began to take on the growth which has been one of the romances of the age, The Michigan Copper and Brass Company found itself with the foundations of a business so laid that it readily and easily lent itself to an expansion that has kept pace with its surroundings.

Mr. Barbour, the first President, retired some years ago; but at the age of 84 (and still President of the largest stove works in the world), he is able to look with pride upon The Michigan Copper and Brass Company that he started, and feel that his judgment was sound and his faith warranted. The $400,000 that was originally put into the plant has grown until today the investment represented is around $6,000,000. The occupied floor space has grown to about 300,000 square feet. The tonnage has grown from about 250,000 pounds a month to a total in 1923 of over 50,000,000 pounds.

Motors for driving rolls and other equipment have, to a large extent, displaced the original steam engine. Metal and other material that was originally transported about the plant on wagons by man-power is now moved with a system of electrically operated cranes, with a saving of time and space and men and money.

Rolls that run at a speed calculated to frighten the old-time roller grind out metal day and night in the largest thin sheet mill in the country, which, of course, means the world.

Electric furnaces have almost entirely eliminated the pit-fire and crucible, and produce a much finer quality of metal in less space and a much cleaner operation.

The original rod mill with its one stand of old-fashioned three-high rod rolls has been almost entirely done away with, and a new department with three extrusion machines takes its place. Housed in a building 420 x 170 this is perhaps one of the very largest and most up-to-date plants in existence.

Brass Rod for screw machine work and for forging is, of course, the chief product of this department, but in addition to this, extruded brass and aluminum shapes are made in large quantities. The bronze work of some of the very finest buildings in this country has come out of the workshops of The Michigan Copper and Brass Company. Real craftsmen of long years of experience are necessary for this work.

Aluminum Molding is also made in this department. The automobile trade, particularly, has created a new and large demand for this item and The Michigan Copper and Brass Company has met this demand with entirely new installation, so that today this has become a really important part of the business. With one exception, the Michigan Copper and Brass Company is the only producer in quantity of this material. The fact that over 300 designs are produced shows the complex nature of this work and also the extent to which it is used.

At an expense of about $40,000 the Detroit River has been connected with a system that supplies unlimited quantities of clean water to the various mills. Clean water in abundance is one of the necessities of the modern mill, and The Michigan Copper and Brass Company is extremely fortunate in being located directly upon this never-failing supply.

D. M. IRELAND
President

Practically all of the buildings are of concrete or brick and steel construction, and further protected from fire by a sprinkler system throughout.

With the facilities of The Michigan Copper and Brass Company so greatly expanded and thoroughly modernized, the brass and copper user of Detroit and vicinity is assured of a source of supply that can meet the most exacting and urgent requirements, and is independent now of delays incident to long-distance transportation, and also of the necessity of large investments in the form of stocks carried.

LAND AND BUILDINGS OF THE MICHIGAN

D. M. Ireland is President. He is a native of Waterbury, Conn., who came to Detroit 35 years ago and established himself in the business of manufacturing brass goods. His experience, therefore, starting as Superintendent of the old Matthews & Willard plant in Waterbury, and later as the head of his own concern, the Ireland & Matthews Manufacturing Company, has been a broad

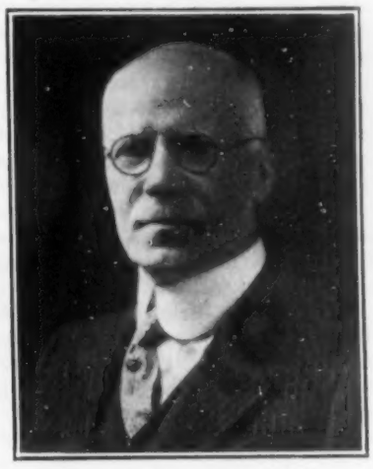
sociated with the American Brass Company, chiefly in accounting capacities. During the formation of the various plants into what was later the American Brass Company, he had much to do with the standardization of various processes and costs in the different mills.

William Westerman, Manufacturing Manager, is another man who has devoted practically his entire life to

Operating Executives of the Michigan Copper and Brass Company

A. B. SEELIG
Vice-President and General Manager

W. M. RULE
Treasurer



WILLIAM WESTERMAN
Manufacturing Manager

one, and few men today have the practical and technical understanding of the art of working brass through its various processes that Mr. Ireland has.

A. B. Seelig is Vice-President and General Manager. His experience in the brass business started 30 years ago, immediately after leaving school. He has never been associated with any other industry than that of brass and copper. Up to five years ago, when he came with the Michigan Copper and Brass Company, most of his business life had been linked with the development of the Chase Rolling Mill Company of Waterbury, Conn., and later during the war, with the Chase Metal Works, of which, at the time of his resignation, he was an officer and also a director.

W. M. Rule, Treasurer, is another product of the brass industry of the East. For about thirty years he was associated with the American Brass Company, chiefly in accounting capacities. During the formation of the various plants into what was later the American Brass Company, he had much to do with the standardization of various processes and costs in the different mills.

William Westerman, Manufacturing Manager, is another man who has devoted practically his entire life to the problems of producing brass and copper. Going back to his early life he was Superintendent for about twelve years of the old Coe Brass Company plant at Torrington, Conn. Later he was Superintendent in charge of the Ansonia plant of the American Brass Company for a period of twelve years. He has been responsible for the manufacturing at The Michigan Copper and Brass Company for the past 7 years.

In going through the mill we find each and every department presided over by men who, like the heads of the concern, have devoted practically their entire lives to the manufacture of brass and copper in its various forms.

The development of The Michigan Copper and Brass Company is just another instance of the headway that Detroit has made in the direction of being self-contained with respect to its ever increasing needs.

COPPER AND BRASS COMPANY, DETROIT, MICH.

British Institute of Metals

Abstracts of Papers Read at the Autumn Meeting in London, England, September 8-10, 1924*

THE RELATIONSHIP BETWEEN TENSILE STRENGTH, TEMPERATURE AND COLD-WORK IN SOME PURE METALS AND SINGLE SOLID SOLUTIONS

By Douglas H. Ingall.

The tensile strengths of annealed and hardened wires of aluminium, silver, nickel, 70/30 brass and 80/20 cupronickel at various temperatures were determined by the constant load and rising temperature method. In all cases a fundamental relationship is found with regard to tensile strength and temperature (previously shown with copper) which is expressed by a straight line up to a critical inflection temperature and by a curved line for higher temperatures. It is suggested that the critical inflection temperature is the all important property of any metal or alloy for high temperature service as it would appear to be the temperature above which viscous flow may take place and below which there is only stability of the material in the cold worked state. Other things being equal, the higher the critical inflection temperature, the more suitable is the material and in this respect the experiments indicate that alloys of nickel, or any other metal of high melting point, which form a continuous series of solid solutions with a high temperature liquidus should prove to appear to the best advantage.

EXPERIMENTS ON THE WORKING OF NICKEL FOR COINAGE

By Sir Thomas K. Rose and J. H. Watson.

The experiments were made in order to determine the conditions in which nickel for coinage could be cold-rolled in the existing rolls at the Royal Mint.

It was found impossible to prepare coins containing 99 per cent nickel with 1 per cent of manganese, magnesium, carbon, iron, silicon, etc., such as are manufactured with the aid of hot rolling. By the addition of 2 per cent manganese, however, castings can be prepared suitable for cold-rolling and conversion into coin. The carbon must not exceed 0.2 per cent and the bars should be not less than 1 in. thick and 2 in. wide. The maximum crucible charge tried was 100 lb. Mond nickel with the addition of not more than 50 per cent of scrap makes a suitable charge. Four annealings are necessary, two at 800° during rolling and one at 675° after rolling and before cutting. The blanks are also annealed. Air is excluded during annealing. The blanks are cleaned before striking by rumbling in a wooden drum with half their weight of nickel pellets in a 2½ per cent acetic acid solution for one-half hour.

The coins consist of a solid solution and accordingly resist tarnishing and corrosion equally well with those containing 99 per cent or more of nickel, such as are in circulation abroad. The two kinds of coin are indistinguishable in appearance, similarly magnetic and equally hard and resistant to abrasion. They appear to be similarly suitable for circulation.

THE DETERMINATION OF SODIUM IN ALUMINIUM

By D. M. Fairlee and G. B. Brook.

A process is described in detail for separating sodium from aluminium which, while possessing reasonable accuracy, could be carried out by the average laboratory assistant. The difficulty of the process will be realized when it is stated that sodium has always appeared among the constituents specified by Government Departments as not allowable in aluminium beyond a trace (0.05 per cent, afterwards reduced to 0.03 per cent).

The accuracy of the process is much greater than that yielded by the majority of analytical methods, particularly in view of the fact that the sodium is probably in suspension, and not in solution in the aluminium. With high purity samples of aluminium, showing a sodium content of 0.008 per cent, the result of many analyses shows a mean error not exceeding 0.0001.

SOME EXPERIMENTS ON THE EFFECT OF CASTING TEMPERATURE AND HEAT-TREATMENT ON THE PHYSICAL PROPERTIES OF A HIGH-TIN BRONZE

By Francis W. Rowe.

The author gives some results of the effect of casting temperature and heat-treatment on a bronze of the following composition:

Copper	86.0
Tin	15.95
Phos.	.05

The alloy represents a bronze of the highest tin content which finds use in engineering practice and is used for special bearings where low tin phosphor bronzes and leaded phosphor bronzes have been found unsatisfactory.

Six boxes of test bars were molded in greensand. Each box contained two bars 14 in. x 1½ in. diameter. The boxes were run at different temperatures. One bar from each box was machined into test bars and tested in the "as cast" state. One bar from boxes 1, 3 and 5 was annealed at 650° C. for 2 hours and one bar from boxes 2, 4 and 6 was quenched in water from 650° C. Tensile, hardness and impact tests were made on all bars. The impact test piece was not the usual B. E. S. A. standard but was 20 mm. square with the standard notch 2 mm. deep.

THE EFFECT OF PROGRESSIVE COLD-ROLLING ON THE BRINELL HARDNESS OF COPPER

By H. Moore.

In a paper recently published by Rawdon and Mutchler of the Bureau of Standards, U. S. A., it is stated that in the cold-rolling of copper, iron, tin and other metals and alloys, the Brinell hardness rose rapidly during the initial stages of deformation and then diminished; "the metal becomes softer and in its final form may be softer than the metal in its initial stage." Experiments have been carried out at the Research Department, Woolwich, to test this surprising conclusion. An annealed copper bar was cold-rolled from 3.12 inch to 0.0125 inch thickness, one half of the material being withdrawn for testing after each reduction of 50 per cent of the thickness. The Brinell hardness number was 48 in the annealed bar, 98 after the first reduction of 50 per cent rose at each subsequent reduction and reached 130 when the thickness was reduced to 1/250 of the original thickness. Balls of 5, 2, 1 and 0.8 mm diameter were used in the Brinell hardness tests, care being taken in testing the thinner strips to avoid error arising from the use of too large a ball and load. The results give no support to the suggestion that severe cold-rolling of copper beyond a certain stage induces softening, and the author considers that convincing evidence of any such effect occurring generally in metals and alloy is still lacking.

*Other abstracts were published in our issue of October, 1924.

Aluminum Alloy Castings From Sheet Scrap

Aluminum Sand Castings to Meet Aircraft Requirements*

By HORACE KNERR, Philadelphia, Pa.

The castings in question are required to meet government specifications corresponding approximately to the well-known commercial alloy No. 12 or to S. A. E. Specification No. 30, as follows:

COMPOSITION

Copper—7.0 to 8.5 per cent.
Impurities—1.7 per cent max.
Aluminum—Remainder.

PHYSICAL PROPERTIES

Specific Gravity—Not over 2.89.
Tensile Strength (Min.)—18,000 lb. sq. in.
Elongation in 2 in. (Min.)—1.5 per cent.

These castings are used chiefly for small, moderately stressed parts of aircraft and their accessories, such as pulleys, brackets, portions of the control mechanism, parts of fuel and oil pumps, threaded fittings and connections in gasoline tanks and lines, etc. In fuel lines, non-porosity is essential, and the fittigns are required to withstand an air pressure test of 10 pounds per square inch without leakage, and must be capable of welding to commercially pure (99 per cent) aluminum sheet and tubing. (Where high strength and lightness are required, special heat treated commercial aluminum alloy castings are purchased.)

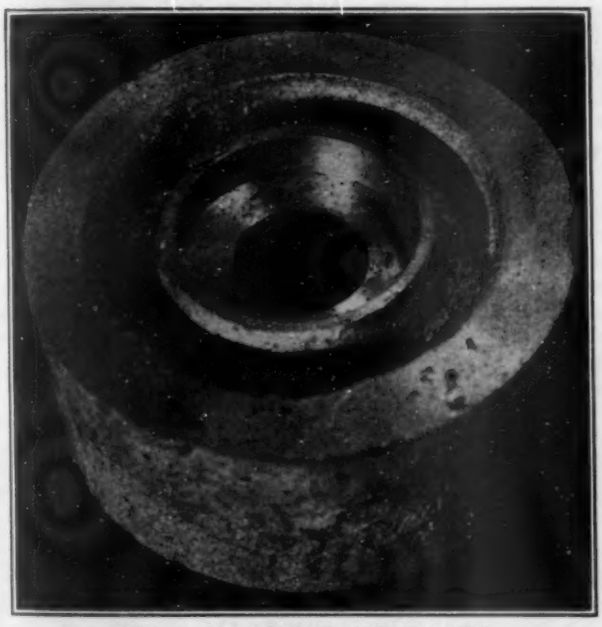


FIG. 1. UNSATISFACTORY CASTING

Much difficulty and annoyance were experienced in attempting to obtain castings from outside sources to meet these moderate requirements. A large proportion of the castings received were exceedingly porous, spongy and unreliable in strength. Many of them had inclusions of foreign matter which interfered with machining and caused weakness. Fig. 1 shows a typical example. Delay in delivery, high charges per pound in small lots, and the cost of the paper work incidental to purchase, were further objectionable features. It was therefore decided to attempt to produce the required castings within the plant, although no foundry work had hitherto been done there.

*A Paper presented at the Joint Meeting of the American Foundrymen's Association and the Institute of Metals Division in Milwaukee, Wis., October 11-16, 1924.

FIRST EXPERIMENTS

The work was undertaken on an experimental basis. A small, second hand oil fired tilting brass furnace was obtained, flasks and a molder's bench constructed, and molders' tools and a ton of medium fine Albany sand were purchased.

Melting was at first done in graphite or plumbago crucibles, but the results were unsatisfactory, presumably on account of the access of furnace gases to the molten metal. A pot was therefore made of welded steel sheet and tubing, as illustrated in Figure 2, which completely excluded furnace gases from the metal. A pronounced improvement resulted, and this was in fact the first step in obtaining sound and satisfactory castings. Although intended for experimental use only the original pot is still in service, at the time of writing, after more than 100 heats, having been repaired several times by welding.

Examination of the interior of the pot after months of use shows very little attack, and it is evident that little or no iron has been taken up from it by the aluminum. No protective coating was used, inside or out. Repairs, or a new bottom, were necessary on account of failure of the welded seam, or by burning through from the outside where in contact with the flame. It is intended to replace this pot by a cast iron pot, to avoid welded seams.

POROUS SCRAP CASTINGS FOUND UNSATISFACTORY FOR REMELTING

It was at first attempted to produce the required castings by remelting scrap aluminum alloy crank cases and similar parts from aircraft engines. These castings were of practically the same composition as called for, but were for the most part very porous. They did not produce sound castings when remelted.

A quantity of 99 per cent aluminum pig was purchased, and the requisite amount of copper added in the form of chopped copper sheet, tubing and wire from the scrap bins. A high percentage of the resulting castings still had to be rejected for porosity.

A considerable quantity of 99 per cent aluminum sheet scrap was available in the plant from the manufacture of fuel tanks, cowling, and other parts for aircraft. Remelting this scrap, with the addition of scrap copper sheet and tubing gave the best results which had so far been obtained. The use of other materials was therefore discontinued, there being ample sheet scrap available to meet the needs of the foundry. The sheet and tubing from which the copper scrap was obtained was purchased under specifications calling for 99 per cent purity. By carefully sorting all scrap, freedom from excess impurities in the castings was reasonably well assured.

TEMPERATURE CONTROL

From the beginning, the need for accurate temperature control was recognized. It was found that there was a strong tendency on the part of the foundrymen to overheat the metal, which invariably resulted in porous castings of inferior strength. A portable pyrometer of the potentiometer type was provided, connected with an iron-constantan thermocouple. The latter was encased in a sheath made of seamless steel tubing, one inch in diameter, with a 1-16 in. wall, closed at the bottom by welding.

PRESENT PRACTICE

The couple is allowed to remain in the bath, and the temperature is observed constantly, from the time melting begins until ready to pour.

When ready to melt, the pot is preheated to a dull red (about 1,300 degrees Fahr.) and gates and risers from previous heats to the amount of about 50 per cent of the charge are added. When these are melted, the sheet aluminum scrap is added, as fast as it will melt. While there is unmelted metal in the bath, the temperature re-

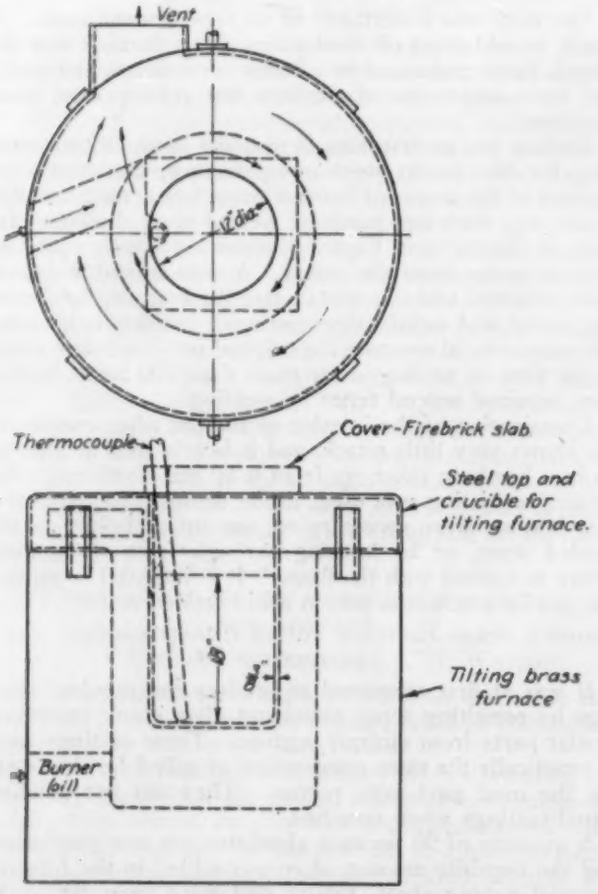


FIG. 2. CONSTRUCTION OF MELTING FURNACE

mains constant at about 1,200 to 1,250 degrees Fahr. If the unmelted scrap gets stuck in the upper part of the crucible, the liquid metal at the bottom may easily become overheated, as heat is added rather rapidly during melting. Moreover, unless the end of the thermocouple is immersed a distance of at least six inches, it is likely to give low readings. Special care is therefore necessary to prevent overheating during melting. The sheet scrap is, of course, carefully weighed before charging. When the aluminum is fully melted the temperature is raised to about 1,350 degrees Fahr. and copper scrap is added in small pieces. Being of thin section, the copper scrap dissolves rapidly in the aluminum. The melt is stirred with an iron rod until the copper is completely dissolved and the melt thoroughly mixed. The metal is then allowed to stand for two or three minutes, and is skimmed.

The metal is now fluxed with zinc chloride (commercially pure), using about one ounce per 100 pounds of metal. The salt is placed in a small cup formed in the end of an iron rod or tube, thrust to the bottom of the molten metal, and stirred until the reaction is completed. The metal is again allowed to stand for a minute or two, carefully skimmed, and then immediately poured. The pouring temperature is held between 1,325 degrees Fahr. and 1,375 degrees Fahr.

About one to one and one-half hours is required from beginning to melt until ready to pour. A melt generally consists of about 150 pounds of metal, the minimum being 100 pounds. On account of the small size of the castings, about 50 per cent gates and risers are produced.

All molding work is done by hand, no mechanical equipment being available. Ramming is light, the work is plentifully vented, and risers are used freely. The sand is kept as dry as practicable.

CORE OVEN

Much difficulty was at first experienced through the unsatisfactory drying of cores in a makeshift core oven. An electrically heated oven was constructed of sheet metal, insulated with magnesia boiler covering, and provided with adjustable vents at top and bottom to insure circulation of air. This furnace requires very little regulation or attention, and the results have well repaid the cost of its construction.

Cores are made from the same sand as is used in molding, with the additional of a commercial binder.

TESTS

Castings which are to be used in gasoline lines are tested for porosity or leaks by closing all openings with the aid of rubber gasketed clamps and injecting compressed air at a pressure of 10 pounds per square inch, with the casting immersed in water.

As is well known, this alloy has a persistent tendency to porosity, even under the best conditions. About 20 per cent of the castings tested show leaks, but the leaks are generally confined to small pin holes. Such castings may be salvaged by impregnating them with sodium silicate which effectually seals them, and does not interfere with subsequent welding or other operations. This treatment is applied, if necessary, after final machining, and the porosity test is then repeated. Castings which have large leaks, permitting free bubbling of air, are remelted. Such cases are few.

TABLE I.
TEST RESULTS FROM FIRST TWELVE HEATS
Specified—Ultimate Tensile Strength (Min.) 18,000 lb. per sq. inch.
Specified—Elongation in 2 inches, 1.5 per cent.

	Specimen No. 1		No. 2		No. 3		
Heat No.	Ultimate Tensile Strength.	Elongation.	Ultimate Tensile Strength.	Elongation.	Ultimate Tensile Strength.	Elongation.	Remarks.
1	18,000	1.0	19,200	1.5	Lost	...	
2	18,100	3.0	18,800	4.0	18,500	4.0	
3	18,800	3.0	18,400	0	.....	...	Rejected for flaws.
4	18,100	3.0	19,000	2.5	22,100	2.0	
5	20,100	3.0	25,000	2.5	21,300	2.5	
6	20,200	3.5	20,200	2.5	20,400	2.5	
7	18,500	1.0	20,700	2.5	20,400	2.0	No. 1 broke at shoulder
8	21,300	3.0	20,400	2.0	20,900	2.5	
9	18,700	1.5	18,800	1.5	19,200	1.5	
10	21,600	2.5	22,400	1.5	22,000	2.0	
11	20,100	1.5	18,900	1.5	19,000	0.5	Flaw in No. 3
12	21,000	1.5	20,500	1.5	19,800	1.5	
Aver.	19,540	2.3	20,200	2.0	20,360	2.1	

Rejections for failure of test specimens to meet physical requirements amounted to seven per cent of the first 100 heats poured. These rejections were mainly due to slightly low tnsile strength caused either by overheating of the melt, by failure to mix the solution thoroughly, or by contamination of the scrap with other material, and were in the majority of cases traced to careless operation. The tensile test results of the first twelve heats are given in Table I.

Flaws, blowholes or inclusions in the metal are rare.

Art Bronze Work

Casting Large Bronze Statuary*

By J. F. ARNOLD, Mount Vernon, N. Y.

Early Biblical accounts inform us that Tubal Cain was an instructor of every artificer in brass and iron, so at that early period, no doubt, bronze, silver and gold as well, played some important part in art; certainly in art, as we read that Abraham's servant bedecked Rebekah with golden earrings and bracelets at the well in Mesopotamia. They were also skilled in the manufacture of commercial articles, for we find that when Solomon wanted brass bath tubs, shovels and basins for the Temple, he sent for Hiram of Tyre, who cast them in the clay ground between Succoth and Zarthan.

Then on down through the ages, we have more or less of this class of work. When we entered the Christian era, there was no doubt that the crafts in this line were still carried on, as we are informed that the silversmiths revolted against St. Paul, as his doctrine would do away with their craft, which no doubt included bronze and brass as well as silver.

When we come to our own experience in the production of art bronze work, we find it difficult to write a description of the process unless some certain piece of bronze work is chosen as a subject, and even then our description is not complete in all its details.

We have chosen for our subject, the bronze statue illustrated in Fig. 1. Keep in mind that this statue is a finished piece of work on all sides, the top and the bottom being the only parts not exposed to view. You will note this statue is in a sitting posture. The dimension are as follows: Base, 3 feet wide, 4 feet 5 inches deep, with a total height of 5 feet 6 inches over all.

MODEL DIVIDED TO FACILITATE MOLDING

The model is furnished to the founder by the sculptor in the plaster of paris. Before starting actual work, there is generally a conference between the sculptor and the founder to determine the number of pieces in which the work is to be produced. In this case, we removed the head, foot and the hand with the biretta. It can be seen that the collar provides a good place to make a concealed Roman joint, as also does the drapery around the hand and foot.

The castings comprising the statue consist of four pieces, the total weight of which was 1,777 pounds made up as follows: Head, 38 pounds; hand and biretta, 29 pounds; foot, 12 pounds; body and chair, 1,698 pounds.

PIECE MOLDING PROCESS FOLLOWED

On receipt of the model at the foundry, it was carefully cleaned and given a coat of shellac varnish. When it was dry, it was ready for the sand. In this case, the model was bedded in the flask, the back of the chair being down. A parting was then made along the molded lines of the back post of the chair and up around the shoulders. On this parting, began the first step of the piece molding process. The base projected 4 feet 5 inches above the bedding. Against this base there was rammed up a block of sand the width and height of the base, following the lines of the same and about 10 inches thick at the base and 6 inches thick at the top. It was reinforced with iron rods much the same as reinforced concrete. The rods forming the reinforcement were securely wired together and so placed the holes of sufficient size could be cut in the block so as to connect the core to it as this block eventually became the core print.

*A Paper presented at the Joint Meeting of the American Foundrymen's Association and the Institute of Metals Division in Milwaukee, Wis., October 11-16, 1924.

The same process was carried out at the neck of the model, the block, of course, being much smaller. These blocks being completed, we made piece molds of all the moldings on the side of the rear chair post and continued this process up through the fringe and drapery to the top molding of the front chair post, terminating even with the base on one end and at about the edge of the collar on the other end. On account of the fringe and drapery, there were a great number of small piece molds, the backs of which were kept flat but tapered toward the top. Each one of these piece molds had an indentation provided in it. When completed, these piece molds were covered with a reinforced sand block about 4 inches thick.

BRONZE STATUE AFTER JOINING

We treated the other side of the model in the same manner. Before proceeding further, we made reinforced sand strip molds across the exposed face of the model at convenient places. These strip molds were set aside for future use in getting the correct contour of the cope of the core.

We then piece molded the face of the model and covered it with a reinforced sand block, which was thick enough to come about even with the cheek of the mold. The cheek of the flask was then ready to be applied and rammed with sand or filled with plaster of paris, plaster of paris in this case.

Then the cope parting was made, the cope applied and rammed with sand. The flask was bolted together and buck bars applied and bolted. The whole flask was then rolled over, the drag bedding removed and parting made. The back of the model was piece molded where required and the drag of the flask was applied and rammed with sand. The flask was then securely bolted together and rolled over, drag side down.

MAKING THE CORE

We then unbolted the flask and removed cope, cheek and reinforced sand blocks. The piece molds were removed one by one and secured to the reinforced sand blocks with paste and wire nails. The model was then free to be removed from the drag mold and any piece molds removed from it and applied in their proper place on the drag mold. We set in place the reinforced sand blocks which were to serve as core prints, first putting in them the necessary perforations to take the reinforcing rods. The drag side of the mold was covered with sheet paraffin the thickness of the metal required. We then applied the other parts of the mold and rammed the space left by the removal of the model with sand, reinforcing same with iron rods. This formed the core. The reinforced sand strips heretofore mentioned were then applied to get the correct contour of the cope of the core.

This core was the same size and shape as the model, except the drag side, which as you will recall was rammed on the sheet paraffin. All sides of the mold were removed, and we had the model reproduced in sand. We then went over this core and shaved the thickness of the metal from it. After the mold was dressed, it was baked in the oven until dry, then removed, assembled and poured.

During all this manipulation, the matter of gates has been taken care of, as has also the size and position of the reinforcing rods that they may be removed from the casting. The same process only on a smaller scale applied to the molding of the head, foot and hand with the biretta.

BOTTOM SPOUT BASIN USED IN POURING

In pouring these castings to insure as clean castings as it is possible to produce, they were all poured from a bottom spout basin. The basin was filled with molten metal, plug withdrawn and a crane ladle at hand kept the basin full of metal, so practically no dross entered the mold.

CLEANING OPERATIONS IMPORTANT

The casting was next removed to the cleaning department, the core, reinforcing rods, gates, sprues and fins removed; thence to the pickling and dipping department, where all sand was removed; thence to the finishing department, where the Roman joints were fitted, doweled and caulked and seams dressed. The chaser then went over it to remove any or all imperfections. When finished, it was oxidized to the tone required.

Casting Valve Bodies

Q.—We are having considerable trouble in casting valve bodies free from leaks and we should be very glad to have your opinion as to how we could overcome this trouble.

We are mailing you herewith a sample of this body casting and also rough sketch (Fig. 1) showing how they are gated. We are using a regular square gate stock with the round runners ⅜ in. in diameter, and the projection on this body on the side where the initial appears is cast

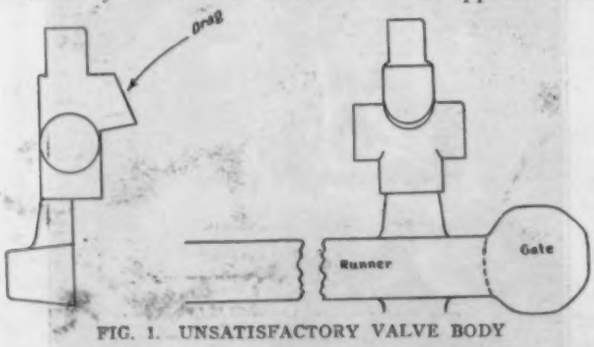


FIG. 1. UNSATISFACTORY VALVE BODY

in the drag, the flat part being in the cope. We are using a mixture of 85% copper, 5% lead, 5% tin, and 5% zinc, making this mixture up ourselves from virgin metals.

These valve bodies have to be tested to 100 lb. air pressure and we find that the leaks occur mostly where the initial is cast in the body or directly opposite this point on the other side of the casting. We have been able to run some of these castings with a loss as low as 10% but some lots run as high as 40% to 50% loss. Inasmuch as there is considerable machine work done on these castings, we are desirous of finding out where our trouble is so that we can avoid this excessive loss.

We are using coke-fired furnaces with a No. 70 crucible and powdered charcoal as a deoxidizer. Our foreman suggests that a small piece of phosphor copper used with this mixture would close the grain enough to prevent leaks, but of course this would harden the metal slightly and make it more difficult to machine.

We are using a regular brass molding sand and keeping it as dry as possible so as to avoid steam and gases.

A.—On examination of sample casting I am of the opinion that your casting is not gated in the proper place and would suggest you gate as per Fig. 2. The gate now is on the small end of the casting and cools off before the casting is set, causing crystallization, and in the production of alloys crystallization merits careful consideration, when some of the constituents of the alloy solidify at a much lower temperature than the balance. An apparently solid casting frequently is produced, which contains minute globules of the easily fusible metal that contracts away from the surrounding solid body and leaves minute space, which form routes for liquids under pressure and will leak through these spaces even at ordinary city water pressure. We are of the opinion most of the troubles with castings that look good, like sample furnished, are

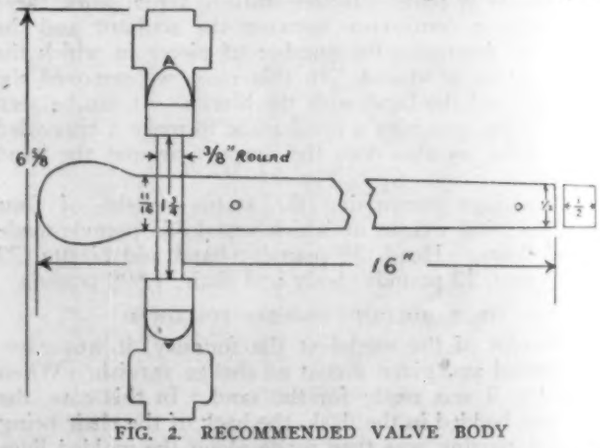


FIG. 2. RECOMMENDED VALVE BODY

caused by crystallization. In your case we are of the opinion your trouble is caused by your gate, and a change as per sketch should help you.—W. J. REARDON.

Lubricant for Drawing Brass or Copper

Q.—What is the best lubricant to use in connection with drawing operations on brass and copper?

A.—For drawing operations on brass and copper the lubricant in general use is composed of soap and water. The quantity of soap used depends largely upon the thickness of the metal and the depth of the draw. One of the best lubricants for drawing operations on brass and copper consists of hard soap dissolved in equal parts of warm water and lard oil.—P. W. BLAIR.

Plating Research of the Bridgeport Brass Company

How a Research Department Helps the Plating Department to Increase and Improve Production*

By JOHN L. CHRISTIE

Metallurgist, Bridgeport Brass Company, Bridgeport, Conn.

Most platers would like to try all sorts of things to improve their work, to cut down the time or expense but with all the responsibility of the plating room, including getting the work out, keeping the help happy and all the other things which come up every day in running the shop, the opportunity is seldom found. They very often try a lot of experiments when they are in trouble, but of course, the best time to try experiments is when things are going along nicely. Often good suggestions for improving the process are tried out when the work is not coming right and will be discarded because the main trouble has hidden their real possibilities.

In the Research Department there is one man, the main part of whose duties is to work along with the Finishing Departments and be of what service his training and experience permit. The purpose of this article is to sum up briefly some of the things that have been accomplished by the Plating Room and the Laboratory of the Bridgeport Brass Company working together. In reality the Plating Room does most of the work and supplies many of the ideas of things to be tried out and the Laboratory keeps the records, acts as secretary and makes out the reports.

The method of attack is, in general, as follows. Someone will have an idea of how to do something better; the Research Department and the Plating Room get together and talk it over and decide if it is worth trying. They test it out for awhile on perhaps one tank; if it works well there they will try it on all the tanks and finally, if it proves worth while, adopt it as standard. They try a lot of experiments that produce negative results, but the only way to learn whether an idea is good or not is to try it out.

Of course, the plating room organization could do the entire job if it wanted to and had the time, but the more efficient way of doing it is to have the work done by a man who is trained in trying things and who has practically no other work to do. There is a right way and a best way to do every job. There is a best strength of plating solution, a best temperature, a best current, a best voltage for any given job. Of course, the head of the Plating Department could try the various ways and hit upon the best one, but where the chemist helps is by his ability to analyze the solutions and relieve the plating room of keeping the records of all the experiments. A plater knows that a solution needs building up; the chemist can tell him just how much salts to add. Sometimes the work in the plating room begins to run poorly; it might be caused by a weak solution, a high current density, too much elbow grease in the nickel buff, greasy work to be plated or a lot of other things. The chemist can tell whether it is the strength of the solution, how much nickel is being deposited on the piece, the composition of the buffing compound, the soap cleaning solution, and so on.

Every plater wants to keep his costs down, and the purchasing agent of the shop helps him. The purchasing agent finds where he can buy the cheapest, but there is one big danger in this, namely, that frequently a lower price means inferior goods. The chemist can be of service here also. One way of finding out whether the new material will be satisfactory is to buy enough to give it a trial in the plating room, but considerable time, trouble and sometimes expense can be saved by performing a few tests on the material to determine whether it will be worth while to buy a trial lot.

Another way of cutting the cost in the plating room is to cut down on the time of plating. This can be accomplished only with good control of the composition of the plating solution, which can be readily told by the chemist. Then too, the chemist can determine the amount of nickel deposited on the work, and from that can be decided whether the shorter time is giving a sufficiently heavy plate. It is possible to save money by using the cheapest cleaner which will do the work, not necessarily the cleaner with the lowest selling price, but the one which actually does the cleaning the most cheaply. Sometimes a few laboratory tests will show that trouble which occurs in the plating room is the result of improper materials or methods in some previous operation. A chemist, not being responsible to any one of two or three departments, is often in a strategic position to see all sides and help settle differences.

The work at the Bridgeport Brass Company along the lines as indicated started late in 1919 or early in 1920. Two men, Messrs. Schramm and Dawson talked things over and agreed to do some work together. The work started just before the plating room was moved from the old building into the new one. The new building was better equipped than the old one and this increased the efficiency itself. Messrs. Schramm and Dawson decided that there were three things that could be done to improve the work. First, there were possibilities of obtaining a better control over the solutions. Second, with the better control it would probably be possible to increase the speed of the work and get more out of the tanks. Third, the better control would make the work more accurate. The following recommendations were made in the first report:

1. Increase the strength of the solution and double the current, cutting the time in half and eliminating the night shift.
2. Equip each tank with electric meters. Of course, this was done when the plating room was moved.
3. Define a standard plate.

The following subjects were suggested for lines of work:

1. The use of pure nickel anodes.
2. Stirring the solution by moving the work.
3. The abandonment of double salts.

The laboratory began analyzing the solution each week and this permitted the exact quantity of salts to be calculated, necessary to build up the solution to the required strength. Shortly after this some trouble was experienced with the steel nozzles of grease guns which were brass plated. It was found that the amount of plate on the nozzles was extremely small and that this was caused by the fact that solutions were very much run down. Biweekly analyses of the brass plating tanks were instituted.

Now here is an example of how wrong conclusions can be obtained from experimenting on too small a scale. They wanted to get away from the old anodes that they

*From an address before the Bridgeport Branch, American Electro Platers' Society.

were using because their high iron content produced sludge in the solution. They equipped a small tank with electrolytic nickel anodes and let it run for a couple of months, keeping a record of the anode corrosion, the amount of work plated in the tank, the amount of salts added and the amount of sludge formed. At the end of two months, the electrolytic anodes looked fine and they decided to run a much larger tank equipped with them, and compare the results obtained with those from the same kind of a tank using the regular anodes. After a few months a comparison was made. The tank with the electrolytic anodes had required less salts to be added to keep the solution at the proper composition; it had produced a heavier nickel plate on the articles taken from the tank; it had formed less sludge and the corrosion at the anodes was better. At this time both tanks were drained and the solutions filtered because of the formation of a yellow sludge, which will be mentioned later in this article. After nine months, however, the comparison did not show the electrolytic anodes to such good advantage. Over this longer period of time the average amount of nickel salts to be added was the same in each case except during the last few weeks when more nickel salts had to be added to the electrolytic tank. The electrolytic anodes did not corrode so evenly as the cast anodes, the result being that a lace-like skeleton was left. More sludge was formed in the tank with the electrolytic anodes than with those containing the cast anodes. The cost of the electrolytic anodes was slightly higher than that of the cast. One reason that the cast anodes gave less sludge was that they had changed to a purer cast anode so those in this test contained only about 1 percent of iron. Because of the higher cost of the electrolytic anodes and the larger amount of sludge formed it was decided, of course, not to continue using them. It was found that the sludge formed in the tank with the electrolytic anodes contained a large amount of nickel which had crumbled away from the anodes and had fallen to the bottom of the tank.

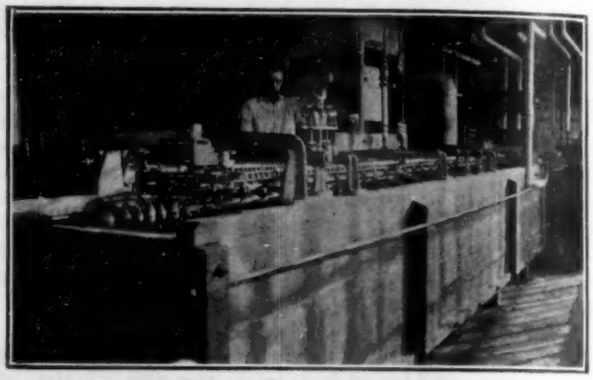
The author mentioned the formation of a yellow sludge which formed in both tanks. This was coincident with the formation of gray raised spots on the work. The spots increased if the tank was stirred or agitated at all or if the current was increased. Analysis showed that the sludge was largely nickel hydroxide, formed because of insufficient acidity in the tanks, or too high a current density. Crumbling of anodes helped make the specks on the work. The tanks were therefore filtered, as stated, and the runs continued.

The matter of single and double nickel salts came up. The name double salts seems to indicate double strength, but, of course, this is not the case. Single salts are nickel sulphate and contain about 21 per cent of nickel, while the double salts are a mixture of nickel sulphate and ammonium sulphate and contain about 15 per cent of nickel. It is the nickel in the salts that they are interested in. At this time (July, 1923) the nickel, when bought in double salts cost 94 cents a pound while the nickel in the single salts cost 77 cents a pound. Nickel itself costs about 40 cents a pound. They considered the manufacture of their own salts but a survey of the apparatus required to do this showed that it would not pay. In July, 1921, a test had been started in which only single salts were used. They worked satisfactorily for quite a while, and since the early part of 1922 only single salts have been used in their tanks, with a consequent saving of money.

In March, 1922, Mr. Dawson heard of a method of determining the acidity of his tanks and asked the laboratory to look into it. A few trials were made and the method was found to be practicable. Since then they have had an easy and accurate measure of the acidity of their tanks. This is done by the use of the indicator, methyl red.

It is a very simple matter for a chemist to determine just how much nickel has been deposited on any piece of work. The plate is dissolved off in acid and the amount of nickel in the acid solution is determined by analysis. You can check by weighing before and after plating. The results of a number of tests showed that the amount of nickel on some of the work was rather small, and that the amounts varied considerably. The possible causes for the variation were considered and on the suggestion of one of Mr. Dawson's men a rack of a slightly different shape was tried out and was found to give much more uniform results. This is quite a factor in keeping satisfied customers. It is not necessary to put a heavy surplus of nickel on some of the caps and waste a lot of time in doing it in order to make sure that the minimum amount on any one is sufficient.

In the chemical laboratory, they determine a large number of copper contents in solutions of their brass every day.



CONTINUOUS PLATING MACHINE

The method of determining is simply to weigh a platinum cathode, deposit the copper out onto the cathode and weigh it again. They found that by bubbling air through the solution and stirring it the length of time for the deposit was greatly reduced. This is done in the brass, copper and nickel tanks also but it is apt to stir up the sludge.

We all know it is essential to have clean work in order to obtain a satisfactory plate. Some attention has been given to the cleaning solutions used in preparing the work for plating. Every lot of whale oil soap that is bought is tested to see if it is up to standard. They are always looking for cheaper soaps.

Frequently they receive samples of soaps that are supposed to be as satisfactory as the one they are now using but which cost less. They usually find that there is much more water in the cheaper soap and it does not pay to buy water at the price of soap. They use a certain amount of mineral cleaner. Analysis has shown the composition of the various cleaners available and has helped to determine which is the best to buy.

About three years ago a very interesting experience occurred with the cleaning tanks. Very shortly after they were made up they became covered with a greasy scum which it was thought was simply due to the action of some plating solution that might have been mixed with the soap, because soap and nickel solution when mixed together will make a scum very similar to this. But they found that they were mistaken. Then they thought it was due to the oil in the steam used to heat the tank. This also was shown not to be the case, and it was only when a conference of all concerned was called, that the real cause of the trouble was learned. It was found that the trouble started when the buff room began using a new kind of

Tripoli composition which had been purchased at a lower price than that paid for the former brand. Analysis of various kinds of Tripoli showed the cause of the trouble. This particular kind contained some resinous material which was extremely hard to remove from the work and which floated on the surface of the water. A campaign was then started to find out which kind of Tripoli gave the best results in the buff room, and which could be purchased at the lowest price, and also whether or not it caused any trouble anywhere else. The Tripoli manufacturers were very much interested and co-operated splendidly. The result was that they made up for the Bridgeport Brass Company a Tripoli composition which was extremely easy to wash.

They have done some other work at the request of the buff room and lacquer room which although not strictly plating problems, might still be of interest. For some time they have been making up their own brush brass composition and considerable work has been done in trying to improve it. Some tests have been made by the Buffing Department to try to determine just what texture of buff wheels gives the best results. Considerable work has been done in the annealing department to produce brass with as fine a texture and smooth a surface as is possible to cut down on the amount of buffing necessary.

In the Lacquer Room some figuring was done to determine whether it would be possible to make a saving by compounding their own lacquer. It was found, however, that it would cost them more to obtain the apparatus and to buy the component parts and mix them than they would pay for the lacquer already prepared. This is as it should be. A concern whose business it is to make lacquer should be able to produce it and sell it to its customers for less than the customers themselves could produce it. Frequently when trouble arises in the Lacquering Department the foreman will get the laboratory and ask for some analyses to be made or some other work to be done. Once a certain lot of thinner seemed to give very poor results. A simple distillation test was run and the result convinced the seller that the thinner was out of line with what he had been giving them. Another time some trouble was experienced with the lacquer in some dip tanks. It was found that because of the daily evaporation it was necessary to build up a new tank using a higher percentage of lacquer and a lower percentage of thinner than was necessary when making the daily addition. Some experiments were run to determine the effect of reducing the pressure used in the spraying nozzles. It was found that by lowering the pressure, 17 per cent less lacquer went on the work but 35 per cent less went into the air; also a more uniform deposit was found on the articles lacquered with the lower pressure. With the low pressure the shell with the least lacquer had 10 per cent less than the average, and the one with the most had 9 per cent more than the average. With the high pressure the shell with the least had 12 per cent less than the average and the shell with the greatest amount had 16 per cent more than the average.

Industrial Fatigue Conditions in the British Metal Polishing Industry

The British Industrial Fatigue Research Board, which works under the control of the Medical Research Council, is a body that was set up under the auspices of the British Government in 1918. Its objects are to undertake research with the view to obtaining a better knowledge of the relations of hours of labor, conditions of employment and methods of work to the functions of the human body, having regard both to the preservation of health amongst the workers and to industrial efficiency. The Board has accumulated a considerable amount of information of great interest to industry in general, and has now issued a summary of the many separate investigations made in individual industries, arranging the conclusions arrived at under two headings, viz.:

1. Working conditions. (This includes all questions concerning the workers as a whole.)

2. Working methods. (This includes all questions which concern more especially the individual worker himself.)

The summary contains a certain amount of interesting matter relating to the metal polishing industry and consequently a brief abstract of the conclusions set down therein may be useful for comparison with conditions in the corresponding industry in the United States.

First, as regards working conditions, it being understood that the results are applicable to all processes of grinding or polishing by means of revolving wheels, the first point tackled was that of vibration. Unfortunately, no definite conclusion could be arrived at regarding the actual effects of vibration on the operatives, but it is certain that these are very considerable and it is suggested that a further and more exhaustive research into this subject is considered to be necessary. The other point coming under the same heading was the question of seating. Here the investigators found that the provision of seats for optional use by the operatives resulted in a slightly increased output and was greatly appreciated by the workers.

On the score of working methods, the first point studied was that of the training of the operatives. Here, in the various processes studied, astonishing differences were found both in the methods of work and in the movements adopted by workers with long years of experience. Eventually the investigators worked out a set of systematized movements and these were adopted in a training scheme. This resulted in a greatly increased output, with correspondingly increased earnings. After two weeks' training on this system novices reached a degree of proficiency which had formerly only been attained after several months' practice. The investigators are therefore strongly of opinion that a definite course of training should be given to every worker who enters the metal polishing industry instead of allowing him to work out a scheme of movements for himself. The latter course is wasteful of human energy and is disadvantageous to both employer and operative.

The next point considered is the question of abrasives. Abrasives can be used in proper and improper ways, but the investigators are very strongly of opinion that it is time an abrasive was found which would prove to be less dusty and dirty than sand. If this could be done the operatives concerned would be saved much discomfort.

The question of speed of revolution of abrasive wheels was also one that was considered. Here, it is pointed out, that further investigation is still required as to the most economical speed of revolution of the wheels and of their best size and breadth for different classes of work and under varying conditions.

In conclusion, it is worthy of note that the recommendations made by the Board have been made with the concurrence of representatives of the industry and it is hoped therefore that practical effect will be given to them as far as possible in the United Kingdom.—U. T. P. S.

Prepared Metal Cleaners

How Profits Result From Reputable Trade-Marked Cleaning Materials

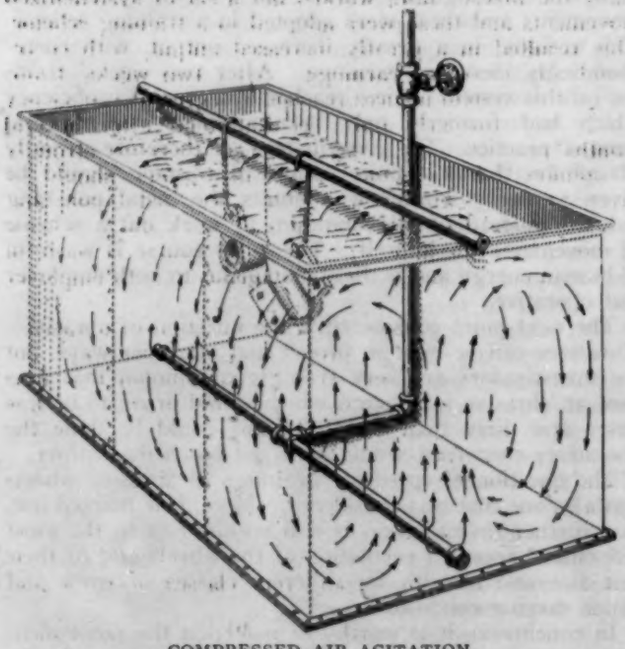
Written for The Metal Industry by T. S. BLAIR, Service Department, J. B. Ford Company

The necessity for "chemically clean" surfaces in modern metal working is well established. Too few of us, however, appreciate that cleaning can be a profit returning factor. With the advent of modern metal cleaning materials and methods there is no longer any justification for regarding metal cleaning operations as a necessary evil and as a time and labor waste.

It is true that definite figures on metal cleaning operations are only useful as a basis for comparison since different shop practices make possible so many varying conditions and methods. However, the following comparisons are of value because they are the record of savings accomplished under average shop conditions by the use of suitable cleaners—savings that may easily be duplicated in your own shop. Despite the belief of a few, gasoline is no longer even classified with economical industrial cleaning materials. The efficiency of modern metal cleaners leaves little opportunity for competition from former unsuitable materials.

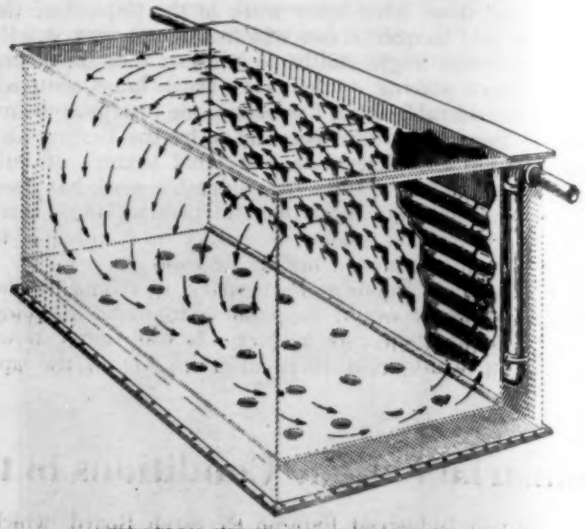
A Detroit auto manufacturer was charging each machine in a line of metal washers with 200 lbs. of commercial soda ash and 70 lbs. of commercial caustic on starting the week's run. An equal amount of each of the above chemicals was the total of the additions made to each machine for each week, making the week's consumption per machine 400 lbs. of soda ash and 140 lbs. of caustic. At current market prices the operation of each machine cost $15.30 per week for cleaners alone.

Department heads believed this cost far too high. Hitherto, the purchasing department had bought only on specification or competitive bids and refused to use any trade-marked cleaning materials. The ban was lifted and today these same washing machines are doing more thorough work in less time than formerly believed possible and at a total weekly cost of $5.98 per machine, a weekly saving per machine of $9.32 to say nothing of the increased speed and efficiency resulting from the use of a suitable cleaning material.



COMPRESSED AIR AGITATION

On the other hand, while introducing trade-marked cleaners in place of commercial chemicals is sound in principle, unless the cleaner introduced is specifically suited to the purpose, extravagance and not economy will result. No better illustration of this may be found than a certain manufacturer who was washing and cleaning castings, etc., in both machine and air agitated tanks. His yearly consumption of one brand of cleaner was 60 bbls. at $60 per bbl. or a total yearly cost of $3,600. He believed this cost could be reduced. Investigation showed that the cleaner used was not adapted to his particular needs and upon the introduction of a different brand of cleaner—a cleaner embodying both chemical and mechanical action—his total yearly consumption of cleaning materials was reduced to 18 bbls. totaling in cost $530.56, and saving him on cleaners alone $3,069.44 per year.



AGITATION WITHOUT COMPRESSED AIR

No single operation in the modern metal industry is more capable of returning profit or loss than is the operation of cleaning.

Proper cleaning equipment many times materially aids in the reduction of cleaning costs. There is no discounting the economy of the metal washing machine for many operations and many good machines are to be procured. Cleaning tanks are also widely used, but in many cases are not equipped with any form of agitation. The installation of agitation (which by the way must not be confused with circulation as they are not synonymous terms) is perhaps the simplest way of reducing cleaning costs. Air agitated tanks have been proved many times more efficient than "still" tanks or even those having good circulation.

The accompanying illustration shows how air agitation may be installed in any cleaning tank. In some shops it is found advisable to couple the Tee pipes shown in the figure so that they may be folded against the side of the tank when it is to be cleaned.

Strange as it may seem, cleaning costs are frequently needlessly increased by using too much cleaner when less would be not only more economical but also more efficient. Modern metal cleaners must meet the test of efficiency—that is, a very little cleaner must do a great deal of work. In the old days metal cleaning materials were shoveled into the tank, and even then efficient cleaning was not al-

ways secured. Today it is not rare for one half an ounce of cleaner to every gallon of water to be sufficient for ordinary work, and in many shops tanks are charged with three ounces of cleaner to the gallon, this single charge being added to as the cleaning strength is used up, and the solution dumped only every eight to ten weeks. Naturally the day of shoveling unmeasured amounts of cleaning materials into tanks or washers has passed.

Moreover, cleaning may also be greatly reduced in efficiency and increased in cost by not having modern metal cleaners thoroughly in solution before starting operations. It sometimes occurs where modern metal cleaners are charged as being "no good" that the tank or washer is so choked with undissolved cleaner, refuse and dirt, as to make true cleaning impossible. There is no doubt that modern metal cleaners are far superior to former materials. However, modern materials in order to bring greatest economy must be used in no greater amount than is required for quick and thorough cleaning. And further, the structure of modern metal cleaners requires that they be thoroughly in solution before cleaning operations are started.

It appears that the success of certain modern specialized cleaners lies in their dual nature. Oliver P. Watts states in an article on "The Theory of Cleaners": "The cleaning effects observed are due, not only to the chemical nature of any substance, but also to the mechanical action of the suspended particles striking against the metal surface. . . . The essential for cleaning seems to be a powder fine enough so that most of it may be kept in suspension, yet of high enough density to have an abrasive action on grease."

A few writers contend that the cleaning material manufacturers have not kept pace with industry, and that there is little available data on cleaning operations. It is true that some types and kinds of cleaning are difficult to solve, and in some cases exact information cannot be given before some experimental work is done. However, experiment and research have well kept pace with cleaning demands and there is available today a wealth of organized cleaning data, making use of specific cleaners for specific purposes, and in practically every case showing reduced cleaning costs, better cleaning, and increased production.

As is but natural, the success of some cleaning material manufacturers has been such as to tempt others to imitate their products and records with inferior and misrepresented materials. Infrequently, there have appeared on the market so-called cleaners which have subsequently been proved to be but commercial chemicals bearing a brand name and a price in excess of commercial quotations. True, a goodly amount of faith may be placed in certain manufacturers, but finally, performance and performance only, is the proof of any cleaner.

In this modern day of speed and efficiency, specialization is demanded. The occupation of the metal worker involves cleaning, but as an incidental part of his work. However, certain individuals and companies do make cleaning their occupation, and have expended much time and money in investigating and perfecting materials and methods for every conceivable kind of metal cleaning operation. The success of such companies has given them financial standing and in them the metal working industry may well place some degree of trust. The representatives of some of these companies are cleaning experts who can give much valuable information to operators and foremen in planning and executing their cleaning operations.

Is it not both economical as well as good business to buy metal cleaners as you buy other supplies, procuring your needs from established firms who are ever in position to supply you and to give you service? The manufacturer who has devoted himself to the production of cleaning materials for a period of years has surely learned valuable lessons which will show in the increased effectiveness of his product and the sound recommendations of his representatives.

Metal cleaning today is not an experiment nor should it be an expensive or laborious operation. On the contrary, modern metal cleaners are so made and may be so used as to show a good profit from cleaning operations.

Conference on Electroplating

The Meeting of the Research Committee and the Electroplating Division of the Bureau of Standards, Washington, D. C., November 14 and 15, 1924

Written for The Metal Industry by C. H. ELDRIDGE, Consulting Metallurgist

For several years the American Electroplaters' Society has co-operated with the Bureau of Standards in the investigation of electroplating solutions and processes. Their Research Committee has met at the Bureau twice a year to discuss progress and to plan for future work. In this way the Bureau has gained valuable suggestions and information, and the platers have been assisted in the application of the results of research to industrial conditions.

At the last conference it was pointed out that such work by the Bureau's Electrodeposition Division might be made more valuable and useful if a larger number of those interested in plating were better acquainted with the methods, results, and applications of these researches. The committee therefore recommend that a general invitation be extended to all interested to attend their November meeting. Accordingly, Friday and Saturday, November 14 and 15, 1924, were selected for the meeting, and all platers, chemists, superintendents, or other factory officials, dealers in platers' supplies and others interested in electroplating were invited.

The conference was held as scheduled and was a distinct success, the attendance being 45 persons.

FRIDAY MORNING SESSION, NOV. 14, 1924

Dr. Hillebrand, Chief Chemist of the Bureau, opened the meeting with a welcome to those present. He said a double purpose of the Bureau was to determine what help the country's industries needed, to give such help where possible, and at the same time to help our government. Dr. Wm. Blum, head of the Electrodeposition Section, then took the chair and presided.

Dr. Blum pointed out that much profitable work was yet to be done, but emphasized the fact that the plating industry must help to decide what problems must be attacked next. A comprehensive list of the Bureau's publications on electrodeposition was given out. The list may be secured by writing for Letter Circular L C 121, May 12, 1924.

Due to limited time, only the Bureau's recent work (1922-1924) on nickel deposition was reviewed and discussed.

HYDROGEN ION (pH) MEASUREMENTS

Dr. Blum pointed out that the pH scale was the best way to express the acidity of a solution so clearly neutral as nickel plating electrolyte. There is also a marked re-

lation between the pH and the character of the deposit. There is no ideal pH; current density and temperature are important factors affecting the pH.

Discussion brought out the points that a low pH (high acidity) helps to avoid iron and nickel hydrate slimes, that if the current density goes up due to increased conductivity through heating, it is best to lower pH (add acid) to avoid burning and poor distribution. With mechanical plating at 100° F. it was found better to decrease nickel percentage than to add acid.

It was also brought out that it is better to titrate for acidity with bromcresol purple as indicator, rather than with sodium alarizin sulfonate, since the latter, although giving a sharp end point, will be affected by metal content, and gives no direct information as to amounts of acid or alkali to add to get a desired pH.

THROWING POWER

Dr. Blum pointed out that the throwing power of an electrolyte depends on three factors: (1) polarization; (2) conductivity; and (3) cathode efficiency. Any change in a nickel plating solution will affect these three factors. "Throwing power" is the property of an electrolyte to give uniform metal distribution on irregularly shaped pieces and deep recesses. Polarization is really the effect of a back voltage caused by the depletion of the metal content of the solution at the cathode surface. The higher the current density at a point on the cathode, the faster is the metal depleted, and the higher is this "back voltage" or counter electromotive force, and this shunts the metal to points of lower current densities (recessed parts) and a more uniform plate is secured. A decrease in temperature, or an increase in cathode efficiency, at high current density, gives better throwing power. The Bureau's Letter Circular L C 125, July 28, 1924, entitled "Throwing Power in Copper and Nickel Deposition" goes into greater detail on this subject.

PURITY OF NICKEL SALTS

The Bureau recommends the following Specifications for nickel salts: zinc not over 0.05%; copper not over 0.02%; iron not over 0.10%; free acid, sulfuric, not over 0.10%.

It was generally agreed that these specifications are fair; in fact several manufacturers can now produce this grade or better at regular prices. It was recommended that nickel carbonate be added to list of impurities in nickel salts. The addition of sulfuric acid, pH = 4 will throw down a precipitate containing 2%-60% nickel carbonate.

The Bureau has done no work as yet on organic matter in nickel salts. Such matter is accidental and is increased by rehandling. An insoluble organic residue is an indication of care taken by the manufacturer. A high insoluble organic residue indicates a high soluble organic content also. Treatment of fresh solution with permanganate will remove soluble organic matter and avoid pitting. Addition of peroxide will also help.

H. E. Haring, chemist for the Bureau, had an interesting exhibit showing the effect of impurities in nickel solution when plating on brass. Impurities were $\frac{N}{1000}$ copper, cadmium and zinc with current densities of 4, 1, 0.4 and 0.1 amp. per sq. inch.

The dulling of the deposits were very marked at low current densities. This means that when high throwing power is required to plate recessed parts, that high purity solutions are required to avoid stains on such recessed parts.

NICKEL ANODES

The Bureau offers tentative specifications for cast nickel anodes as follows: Nickel 95-97%; Carbon more than 1.25%; Copper less than 0.25%; Sulfur less than 0.18%. Iron, tin, or silicon, up to 1%, permitted, not recommended.

There was much discussion on this subject. Tin up to 2.5% was recommended by one speaker to eliminate sludge. The structure proper to cast nickel, and the use and structure of rolled anodes, brought forth a diversity of opinions.

REPORT AND DISCUSSION OF RECENT RESEARCHES ON NICKEL DEPOSITION

PROTECTIVE VALUE OF NICKEL PLATING ON IRON AND STEEL—C. T. THOMAS

This subject will form the basis of a complete report soon to be issued by the Bureau. Much discussion was aroused over the subject of accelerated corrosion tests to show up pores and pits. One speaker claimed that if cleaning is right that a 3/10 of a thousandth plate is pore free. Discussion showed a general opinion that not only is a clean surface highly essential to avoid pits and pores, but that the physical condition of the surface, whether rough or smooth plays an important part. The Bureau is continuing its study of porosity of nickel plate.

NICKEL PLATING ON ZINC AND DIE CASTINGS—M. R. THOMPSON

This subject was of great interest as judged by the discussion. Mr. Thompson's investigation will be published in detail by the Bureau at a near date. He recommends the use of a "high sulfate" bath which offers many advantages, including high conductivity and high throwing power. Tests conducted in a large plant showed that the high conductivity reduced voltage required from 2.5-3.0 volts to 2.00-2.25 volts and gave a fine throwing power. The discussion also brought out the statements that in barrel plating on safety pins, and in barrel plating on brass parts the high conductivity of this "high sulfate" bath was an important factor in reducing applied voltage. Although the composition of die castings vary, the new standard type is 92% zinc, 3% copper, 5% aluminum.

Several cleaning solutions were recommended for die castings, being essentially sodium carbonate, caustic, trisodium phosphate and soap; quite dilute and used for 10-30 sec. as electrolytic cleaner. Another plater successfully cleans die castings in a boiling solution of sodium carbonate and sodium cyanide. A red oxide appearing on die castings during plating is due to high aluminum (7% or more).

SATURDAY SESSION, NOV. 15, 1924

R. L. Shepard, Chairman of the Research Committee of the American Electroplaters' Society, presided. Dr. Geo. Burgess, Director of the Bureau, welcomed the visitors, and praised the motives of the conference.

FUTURE RESEARCH AT THE BUREAU

Dr. Blum outlined the work now planned by his division. Mr. Haring is to turn his attention to chrome plating; Mr. Thompson and Mr. Thomas to the study of zinc sulfate solutions with special attention to increased throwing power. Mr. Winkler will continue the study of electrotyping. Other points to be investigated were cyanide solutions in general and brass plating solutions in particular.

Dr. Blum made a special plea that persons writing to the Bureau for suggestions should report on results obtained, whether favorable or otherwise, and asked those

connected with the industry to voice an opinion as to the value of fundamental investigations, such as researches on throwing power, or the structure of deposits.

BRASS CYANIDE SOLUTIONS

Discussion brought out the general opinion that much information is needed on brass plating solutions, including anodes, metal ratio of solution, brighteners, effect of temperature and current density, anode corrosion, structure of deposit, stripping methods, amounts of arsenic allowable, purification of solution by removal of carbonates, and above all adequate methods of analysis of brass cyanide solutions. Carbonates cause much trouble, crystallizing out at 25°F., and cause dulling if present in amounts of 18 oz./gal. or over. Carbonates as high as 32 oz. per gal. may be removed by freezing out in winter, or by boiling out. As much as 40% of the carbonates have been removed by boiling such a solution down 15%.

ZINC PLATING

A new method was suggested as an aid to show up the distribution of a zinc plating on steel. Piece to be tested is treated at 95°C. with a solution containing sodium peroxide 10 gm. per liter, and glacial acetic acid, 35 gm./L. A rust stain will appear after a few minutes where plating is thin.

CHROME PLATING

Interest in chrome plating is steadily increasing. This plating may be used for decorative finishes, to provide a hard surface, to protect against high temperature, oxidation, and as a protection against rust. The latter property deserves more careful study. Dr. Blum pointed out that some of the drawbacks to chromium plating are the low cathode efficiency and low conductivity.

INSTRUMENTS

A plea was offered for a simple colorometric device to determine pH, not subject to a rapid change in color of dyes used. It was suggested that a drop of formaldehyde would preserve the true color of dyes in the pH comparator wedge now commonly used.

Discussion failed to bring forth any simple method of determining the area of irregular shaped pieces.

SPECIFICATIONS FOR PLATING

There is a dearth of specifications of all kinds, especially for nickel plating on steel and for silver plating. The Bureau specifies that for nickeled faucets 0.0002" thickness of plate is required to stand wear. A thickness of 0.0001" is a little better than the average plating now used on faucets. In general, manufacturers should agree on more of such specifications.

In the discussion as to testing of silver plating for tableware, the best method seems to be to strip the plating against time. This at least will show degree of uniformity of distribution.

CLASSES FOR PLATERS

Discussion of this subject was spirited and brought out many diverse opinions. In Philadelphia the classes are very successful and well attended. There is little or no cost and the students start in with titrations. This work is carried on at the University of Pennsylvania laboratories. Past experiences in Waterbury indicate that the plater begrudges more than a night or two each month and is not particularly interested in the chemistry involved.

In Newark, the interest is increasing. It is suggested that such instruction is not appreciated by the student plater if given free of charge.

CONFERENCE OF PLATERS AT BUREAU OF STANDARDS, WASHINGTON, D. C.

Brass, Bronze, and Copper Products

The Department of Commerce, Washington, D. C., announces that, according to data collected at the biennial census of manufactures, 1923, the establishments engaged primarily in the production of brass, bronze, and other nonferrous alloys or in the manufacture of articles made from these alloys or of copper reported products valued at $511,470,131, an increase of 138 per cent as compared with 1921, the last preceding census year. Of this total $406,104,255 was contributed by "products for remanufacture," $83,348,316 by finished products, $20,297,237 by products other than nonferrous alloys and copper, and $1,720,323 by custom work and repairing. The products for remanufacture comprise the following items: Ingots and bars, $26,491,758; plates and sheets, $113,670,335; rods, $59,682,732; seamless tubing, $32,946,514; brazed tubing $4,487,149; plain wire, $48,483,219; insulated wire, $10,854,359; rough castings, $71,970,574; and finished castings, $37,517,615. The group of finished products was made up as follows: Lamps, $263,720; electrical supplies, $3,834,170; hardware and trimmings, $7,340,229; and other manufactures of copper and nonferrous alloys, $71,910,197.

In addition, similar classes of products were manufactured to some extent by establishments engaged primarily in other industries. The value of such commodities thus made outside the industry proper in 1921 was $52,476,473,

an amount equal to 24.4 per cent of the total value of proucts reported for the industry as classified. The corresponding value for 1923 has not yet been ascertained but will be shown in the final report of the present census.

Of the 1,035 establishments reporting for 1923, 172 were located in New York, 112 in Pennsylvania, 106 in Illinois, 98 in Ohio, 82 each in Massachusetts and Michigan, 69 in New Jersey, 68 in Connecticut, 51 in California, 27 in Wisconsin, 24 in Indiana, 21 in Missouri, 15 each in Maryland and Rhode Island, 10 each in Colorado and Washington, 9 each in Minnesota and Texas, 7 in Oregon, 6 in New Hampshire, 5 each in Iowa and Kentucky, and the remaining 32 in 13 other states and the District of Columbia.

The statistics for 1923 and 1921 are presented in Tables 1 and 2, following. The figures for 1923 are only preliminary and therefore subject to such correction as may be found necessary upon further examination of the returns.

TABLE 1.—GENERAL STATISTICS FOR THE INDUSTRY: 1923 AND 1921

	1923	1921	Per Cent of Increase
Number of establishments	1,035	911	13.6
Wage earners (average number)[a]	64,716	39,830	62.5
Maximum month	May 68,998	Jan. 42,383	.....
Minimum month	Dec. 60,014	July 37,023	.....
Per cent of maximum	87.0	87.4	.....
Wages	$88,839,005	$46,260,303	92.0
Cost of materials (including fuel and containers)	$331,756,688	$130,627,160	154.0
Products, total value	$511,470,131	$214,903,735	138.0
Value added by manufacture[b]	$179,713,443	$84,276,575	113.2
Horsepower	307,344	(c)	.....
Coal consumed (tons of 2,000 lbs.)	794,372	(c)	.....

[a] Not including salaried officers and employees nor proprietors and firm members. Statistics for these classes will be given in final report.
[b] Value of products less cost of materials.
[c] Not reported.

TABLE 2.—PRODUCTS, BY CLASS, KIND OF METAL OR ALLOY, QUANTITY AND VALUE

Product	Census Year	Brass	Bronze	Copper	Other metals and alloys[a]	Value
Aggregate	1923	.....	.....	.....	.....	$511,470,131
	1921	.....	.....	.....	.....	214,903,735
Group 1.—Products for remanufacture:		Pounds	Pounds	Pounds	Pounds	
Total	**1923**	1,010,668,069	201,007,861	611,502,692	113,122,904	406,104,255
	1921	390,147,440	88,089,778	242,126,003	62,677,531	158,147,563
Ingots and bars	1923	113,828,726	8,295,882	27,962,423	36,025,229	26,491,758
	1921	32,040,384	3,495,275	2,284,515	10,846,361	6,184,566
Plates and sheets	1923	337,213,620	22,664,185	135,788,265	36,046,973	113,670,335
	1921	115,261,203	8,784,902	68,534,490	15,736,113	42,867,256
Rods	1923	130,075,161	4,637,125	161,365,451	19,181,518	59,682,732
	1921	39,060,174	2,293,429	40,971,253	184,592	13,234,039
Tubing:						
Seamless	1923	72,999,797	6,048,802	40,372,062	501,149	32,946,514
	1921	37,436,066	1,506,031	18,195,028	526,999	13,849,917
Brazed	1923	15,162,381	142,091	82,114	.....	4,487,149
	1921	3,077,761	93,142	374,198	.....	1,070,687
Wire:						
Plain	1923	55,072,088	15,832,121	185,276,301	799,886	48,483,219
	1921	18,748,700	8,526,123	94,249,187	750,884	20,709,474
Insulated	1923	.....	.....	52,305,740	.....	10,854,359
	1921	.....	.....	14,527,036	.....	2,351,406
Castings:[b]						
Rough	1923	148,667,834	125,432,082	7,777,462	18,499,042	71,970,574
	1921	144,523,152	63,390,876	2,990,296	34,632,582	57,880,218
Finished	1923	137,648,462	17,955,573	572,874	2,069,107	37,517,615
	1921	(c)	(c)	(c)	(c)	(c)
Group 2.—Finished products:		Value	Value	Value	Value	Value
Total	1923	$60,014,651	$8,991,596	$7,083,239	$7,258,830	$83,348,316
	1921	33,092,885	3,460,063	1,557,909	1,028,516	39,139,373
Lamps	1923	243,127	.....	10,593	10,000	263,720
	1921	157,114	.....	.....	71,064	228,178
Electrical supplies	1923	3,157,796	.....	652,470	23,904	3,834,170
	1921	2,787,460	10,000	557,277	3,333	3,358,070
Hardware and trimmings	1923	5,578,157	1,083,071	240,385	438,616	7,340,229
	1921	7,035,182	328,357	209,659	.....	7,573,198
Other manufactures of non-ferrous alloys and copper	1923	51,035,571	7,908,525	6,179,791	6,786,310	71,910,197
	1921	23,113,129	3,121,706	790,973	954,119	27,979,927
Products other than non-ferrous alloys and copper	1923	.....	.....	.....	.....	20,297,237
	1921	.....	.....	.....	.....	16,213,878
Amount received for custom work and repairing	1923	.....	.....	.....	.....	1,720,323
	1921	.....	.....	.....	.....	1,402,921

[a] Chiefly aluminum, but includes small quantities of white metal, Monel metal, zinc, and German silver.
[b] Reported as "Castings and machinery fittings" for 1921.
[c] Not reported separately; included with rough castings.
[d] Includes waste, scrap, etc.

THE METAL INDUSTRY

With Which Are Incorporated

THE ALUMINUM WORLD, COPPER and BRASS, THE BRASS FOUNDER and FINISHER
THE ELECTRO-PLATERS' REVIEW

Member of Audit Bureau of Circulations and The Associated Business Papers, Inc.

Published Monthly—Copyright 1924 by THE METAL INDUSTRY PUBLISHING COMPANY, Incorporated

Entered February 10, 1903, at New York, N. Y., as second class matter under Act of Congress March 3, 1879

SUBSCRIPTION PRICE, United States and Canada $1.00 Per Year. Other Countries $2.00 Per Year :: SINGLE COPIES, 10 CENTS
Please Remit by Check or Money Order; Cash Should Be Registered

ADVERTISING RATES ON APPLICATION. FORMS CLOSE THE FIRST OF THE MONTH

Palmer H. Langdon.....Editor and Publisher
Adolph Bregman .....Managing Editor
Thomas A. Trumbour.....Business Manager

ADDRESS ALL CORRESPONDENCE TO
THE METAL INDUSTRY, 99 JOHN STREET, NEW YORK
Telephone Number: Beekman 0404. Cable Address: Metalustry

Vol. 22 New York, December, 1924 No. 12

Contents

The Michigan Copper and Brass Company 475
A Record of the Growth and Expansion of One of the Early Mills Located in the Middle West.
By A. MILLMAN

British Institute of Metals 480
Abstract of Papers Read at the Autumn Meeting in London, England, September 8-10, 1924.

Aluminum Alloy Castings from Sheet Scrap 481
Aluminum Sand Castings to Meet Aircraft Requirements.
By HORACE KNERR

Art Bronze Work 483
Casting Large Bronze Statuary.
By J. F. ARNOLD

Casting Valve Bodies 484
By WM. J. REARDON.

Lubricant for Drawing Brass or Copper 484
By P. W. BLAIR

Plating Research of the Bridgeport Brass Co. 485
How a Research Department Helps the Plating Department to Increase and Improve Production.
By JOHN L. CHRISTIE

Industrial Fatigue Conditions in the British Metal Polishing Industry 487

Prepared Metal Cleaners 488
How Increased Profits Result From the Use of Reputable Trade-Marked Cleaning Materials.
By T. S. BLAIR

Conference on Electroplating 489
The meeting of the Research Committee and the Electroplating Division of the Bureau of Standards, Washington, D. C., November 14-15, 1924.
By C. H. ELDRIDGE

Brass, Bronze and Copper Products 491

Editorials 494
Commerce Department and Metals
Foundry Apprentices
Ships Without Sails or Engines
Practical College Training
Business Situation, The

New Books 496

Technical Papers 497

Shop Problems 498

Patents 500

Equipment 501
Continuous Electric Core Ovens
Small Electric Furnaces
Crucible Pouring Device
Super Refractories
Johnson Melting Furnace
Durex Bearing Material
Window Cleaner

Associations and Societies 504

Personals 505

Deaths 506

News of the Industry 506

Review of the Wrought Metal Business 513

Metal Market Review 513

Metal Prices 514

Supply Prices 516

EDITORIAL

COMMERCE DEPARTMENT AND METALS

The work of the Department of Commerce continues to be of great importance and assistance to industry in general, and to the metal industries in particular. While this department covers a broad field, including many lines which are far removed from metals, some of its general activities have a strong bearing on our industries.

The project of co-operation between the Federal and State authorities to promote the interconnection of electric power and lighting systems frm Maine to Maryland, is one example. This project known as the Super-power Survey has a strong bearing on the use of copper and perhaps aluminum, for power transmission purposes, and its work is watched with interest. So far it consists of a preliminary survey which has shown that 40 per cent of the mileage of the railways in this territory could be electrified and that power could be extended widely into farms and homes. These facts immediately point to an increased use of metals.

Another project of far-reaching importance is that of revision of Federal and State purchasing specifications. A Division of the Bureau of Standards was created to develop standard specifications, working in co-operation with manufacturers. Later this division joined with a committee, made up of members of various departments and working directly under the Bureau of the Budget, known as the Federal Specifications Board to facilitate this work. So far 210 standard specifications have been prepared.

The Division of Simplified Practice, established early in 1921, serves as a centralizing agency for producers, distributors, and consumers to cut down unnecessary lines, styles, types and sizes. Typical results of this work are the reduction of varieties of paving brick from 66 to 5; files and rasps from 1351 to 498; range boilers from 130 to 13; woven wire fencing from 552 to 69; forged tools from 665 to 351, etc.

Trade associations have been one of the most important agencies through which the Department of Commerce has worked for industry. "A small minority of these associations have in the past been used as cloaks for restraint of trade by such activities as upon price associations. The vast majority, however, have no such purpose and do no such things." Their constructive work has consisted of the collection and distribution of statistics of production, capacity, stocks on hand, shipments, orders on hand, cancellations, number of employees, etc. These trade associations have co-operated with the department in eliminating useless varieties and types; settling trade disputes by arbitration; stamping out unfair practices; promoting the welfare of employees; co-operating in insurance matters, credit information, and economies in transportation.

The Bureau of Standards has notable accomplishments to its credit. In the first place there has been a large increase in the number of tests conducted during the past year. Also there has been the successful development of methods for reducing loss in the baking of japanned ware; co-operation with technical societies, and aiding their work of standardization, such as that carried on by Committee B-2 of the American Society for Testing Materials and the Joint Committee on Molding Sand Research of the American Foundrymen's Association. As previously stated, the bureau works in close conjunction with the Federal Specifications Board and they are now compiling a handbook of specifications. The Division of Chemistry has worked out several new methods for the analysis of alloys of platinum metals. It has continued research in the field of electro-deposition on the general principles of "throwing power," and various types of nickel solutions. One new major product of fundamental importance is the study of the atomic study of metals by the X-ray spectrograph.

Work on the standardization of methods for testing the resistance to corrosion of metals and alloys is being carried on with the Society for Testing Materials. The properties of metals and alloys at high temperatures are being studied in co-operation with the Society of Mechanical Engineers, and the Society for Testing Materials.

The above is a very sketchy record of an enormous amount of work accomplished under the stimulating influence of Secretary Hoover. It is a bright spot in the history of American Government and industry, and should be aided morally and financially to the fullest extent.

FOUNDRY APPRENTICES

It is an old story that one of the crying needs of the foundry industry is efficient labor. It seems that the old time molder, the handy man of the foundry, who could be used anywhere and who could rise to any emergency, is fast disappearing. The molding machine calls for brawn rather than brain.

An interesting effort in the direction of improving this situation is the work being done in Milwaukee. A paper by H. A. Frommelt, Director of Apprentice Training of the Falk Corporation of that city, read before the recent Milwaukee meeting of the American Foundrymen's Association, tells the story of this effort. The foundries in the Milwaukee district have co-operated through the National Metal Trades and the Vocational Schools, the local vocational school acting as a clearing house for the foundries. Young men are trained by making their vocational school work fit in with their foundry experience; they are transferred from plant to plant to boaden their experience and a real course in foundry training is thus worked out, combining the class-room with the plant. According to Mr. Frommelt, apprenticeship has taken on a new dignity in the eyes of both the apprentices and their parents, and

in this way one of the obstacles in the way of getting young men to take up foundry work has been removed.

A similar plan, although in a different field, has been operating for over a year in Pittsburgh, carried on by the Sheet Metal Contractors Association of Pittsburgh, and local union No. 12 of the American Sheet Metal Wrokers International Alliance. Through this plan about 65 sheet metal apprentices will attend classes one day a week during the coming year at the Carnegie Institute of Technology. The employers pay the apprentices their full day's wages while they are attending classes, and the union officials assume the responsibility of compelling the apprentices to attend classes.

These are only instances of a movement which is gaining in strength. The last decade seems, unfortunately, to have made even skilled labor a thing to be looked down upon the more by the younger generation. There is no surer way of bringing back the old respect for the dignity of honest work than the co-operation of employers and employees, aided by educational institutions.

SHIPS WITHOUT SAILS OR ENGINES

One of the most important fields for the use of metals the shipbuilding industry is again threatened with a revolution in its method of developing motive power by the advent of the German "Rotor."

Originally ships were of wood, moved by wind pressure on sails, and the only metals (outside of iron) used were for trimmings, locks and such incidentals. Then the steam engine came in, gradually sweeping sails off the seas, and greatly enlarging the use of metals in bearings, bushing, propellers, etc. It was followed by the turbine and a comparatively short time afterwards by the Diesel engine, both of which threatened to force out the old steam engine, but which have simply taken a share of its work away from it, and occupied their own places in a reorganized field.

Throughout these changes the uses for metals have increased. The corrosive attack of sea water and sea air made it imperative to build the engines of materials that would stand both wear and corrosion. The steam power plant required brass condenser tubing. The introduction of the turbine brought forth the industrial art of making the bronze blades. Brasses and bronze are indispensable in the delicate scientific instruments which are on every ship. It seems that so far at least no change has been made in marine engineering without increasing the use of metals.

The Rotor, the latest device to enter the marine field is the invention of Anton Flettner, and has been taken up by the Hamburg-American Steamship Company. According to press reports this company has decided to build, immediately, ten freighters of this type, of 10,000 tons each. According to the inventor, the Rotor will not wholly replace engines but can be substituted for them at times or used in conjunction with them. The Rotor is said to be a peculiar and most efficient wind using machine which transmits the power to the driving mechanism of the ship. Just how this is done is still a secret since no intelligible explanations or detailed illustrations have yet been published.

So far as the metal industries are concerned, however, it is safe to say that no matter what this new device replaces, it will still require metals and for that reason, although the forms in which they are used may be changed, the quantities should not be affected. The marine field has always been a stronghold of metals, and the climatic conditions are such that their elimination to any extent, is doubtful.

PRACTICAL COLLEGE TRAINING

An interesting booklet has come to us from Antioch College, Yellow Springs, Ohio, giving in a very few words what it calls the Antioch Business Code. Antioch College combines in a single coordinated course a liberal college education, vocational training, and actual experience in practical life. The students spend half time at college, and half time at practical work, in alternate periods of five weeks. Training for business administration is one of the chief vocational aims of the college, and much of the part-time work is training for that field. The Antioch business code was developed as a guide to the students in determining whether the part-time jobs are suitable to them, and to help fix standards and habits for application through life.

At Antioch, business is looked upon as one of the great professions. They state that if they can develop an honest desire to work out sound business principles, and an honest effort to put them into practice, worthwhile results will follow. Repeatedly men are torn between the desire to live by the finest ideals and the necessity for meeting practical issues in a practical manner. He is an educated man who, through experiencing this stress, has learned to harmonize such conflicting demands.

The work is original only in the sense that this is the first college of prominence to try out these methods which have often been mentioned as feasible and desirable. Of course, it is a long step between the idea and the successful application, but at Antioch, we are told, this seems to be in a fair way toward accomplishment. The question of combined basic training and early practical application has always been a vexing one and if Antioch succeeds only in a measure, it will have earned gratitude of the public as well as its students.

THE BUSINESS SITUATION

The election is over and politics, the great American sport for which business is put aside at least once every four years, have been laid on the shelf. From the general trade reports, from personal interviews, and from the opinions published in the press, it seems that on the whole, the result has been satisfactory to business. If the New York stock market is any indicator at all, business should be ready for a lively period.

Aside from guesswork based on speculative factors, several needs are really clear. The mere fact that the election is over removes an important excuse for delays. Regardless of differences of opinion about the result, the fact is that it is settled, and we know where we stand for the next four years. In addition to this, the election seems to have indicated clearly the desire for a conservative Government, one which will make as few changes as possible and which will work for economy in Government, reduction of taxation and the general welfare of business.

Mental attitude is an important factor in our prosperity, and insofar as this is concerned, it is safe to say that prospects are good for a prosperous period.

GOVERNMENT PUBLICATIONS

Manganese and Manganiferous Ores in 1923. By Helena M. Meyer, U. S. Geological Survey, Washington, D. C.

Lead in 1923. By C. E. Siebenthal and A. Stoll, U. S. Geological Survey, Washington, D. C.

Arsenic in 1923. By V. C. Heikes and G. F. Loughlin, U. S. Geological Survey, Washington, D. C.

Department of Commerce Report. Twelfth Annual Report of Secretary of Commerce, Washington, D. C., covering Economic Progress; Elimination of National Waste; Legislative Recommendations; Condensed Bureau Reports.

New Books

Journal of the British Institute of Metals. Volume XXXI. Published by the British Institute of Metals, 36 Victoria street, London, England. Size 5½ x 8½, 680 pages.

The volume includes the proceedings of the General Meeting of the Institute, held September 10, 1923. Most of the chapters quoted were published in abstract in previous issues of THE METAL INDUSTRY.

Die Metallfarbung (Coloring Metals). By Georg Buchner. Published by M. Krayn, Berlin, Germany. Size 8 x 10½, 383 pages. Price $4.

This is the sixth revised edition of a handbook for those engaged in chemical, electrochemical and mechanical metal coloring, including description of the historical development of the art. It is a very practical book on the surface treatment of metals, and will be decidedly interesting and useful to those engaged in this work.

Die Legierungen (Alloys). By A. Ledebur. Published by M. Krayn, Berlin, Germany. Size 6½ x 10, 424 pages. Price $5.75.

This is the sixth edition, greatly extended and enlarged of the work by Dr. Ledebur. The first chapter is general in its scope but is followed up by descriptions of the properties of metals and their alloys, the preparation of alloys, the most important industrial metals and their combinations. It is a general handbook and guide for those engaged in metal working, and as such reflects the modern German practice.

Book of Tentative Standards. Published by the American Society for Testing Materials. 825 pages. Price payable in advance $7.00-$8.00, depending upon binding.

The 1924 edition of the Book of A. S. T. M. Tentative Standards, which is issued annually, will be ready in November. This publication contains proposed standards printed for one or more years with a view of eliciting criticism which is taken into consideration before their final revision and adoption as standards. Eighteen tentative standards are included for metals and 11 for iron and steel; also 3 tentative revisions are included for metals.

Book of Standards. Published by the American Society for Testing Materials. 1,150 pages. Price payable in advance, $11.00-$12.50, depending upon the binding. For sale by THE METAL INDUSTRY.

The 1924 edition of the Book of A. S. T. M. Standards, which is issued tri-annually, will be ready in November. A total of 220 standards will be included, of which 39 will relate to metals, 73 to iron and steel, and the rest to other materials. The specifications are authoritative and excepted nationally. The volume should be in the hands of everyone manufacturing, purchasing or using metals.

Research Information Surveys on Corrosion of Metals—No. 4-6. Zinc, Tin, Lead. Compiled by Harold F. Whittaker. Published by the National Research Council, Washington, D. C. Size 8¼ x 10¾. Price $2.

A compilation of the information accumulated by the National Research Council, in its work of investigating the corrosion of various metals. This is the second book published, the first (Numbers 1-3) having been issued some months ago on nickel, aluminum and copper. The information is authentic, of course, and is part of a systematic campaign on the subject of corrosion. It is indispensable reference information and by far the most complete yet published.

Combustion. Published by the American Gas Association. Size 9 x 11, 74 pages. Price payable in advance, $3.00. For sale by THE METAL INDUSTRY.

This is the second of a series of 12 pamphlets dealing with specific subjects under the general classification of Industrial Gas and is intended for a reference book on the theory and practice of the principles of combustion. It is necessarily condensed to include such a large subject within a small book, but is none the less valuable for that reason.

Subjects covered are as follows: Heat and Its Measurement; Correction for Temperature and Pressure; Chemistry of Combustion; Calorimetry; Thermal Capacity; Flame Temperature; Analysis of Furnace Gases; Recuperation and Regeneration; Factors Affecting the Efficiency of Utilization of Gaseous Fuels; Fuel Comparisons.

A Laboratory Manual of Machine Shop Practice. By J. H. Service and Geo. E. Frease. Published by D. Van Nostrand Company. Size 5 x 8, 106 pages. Price payable in advance, $1.25. For sale by THE METAL INDUSTRY.

This book has been written primarly to assist the teacher to organize and conduct a course to aid his students to earn a living. It is therefore, essentially a practical textbook and guide. It is short, terse and simply written.

The method followed is to take up various topics, one at a time, such as chipping out an anvil, tool grinding, making a bushing, or finishing the taper end of an axle shaft. Thirty-five such topics are detailed, then a bench drill project is taken up and covered at length.

In the appendix topics are suggested for lecture group discussions or readings. Tables of various standards are given and considerable information is included for the use of a teacher in conducting his class. The book is extremely simple and easily understood, and should be a valuable aid to the machine shop worker.

Henley's Twentieth Century Book of Receipts, Formulas and Processes—Edited by Gardner D. Hiscox. Size 6 x 8½, 806 pages. Published by the Norman W. Hanley Publishing Company. For sale by THE METAL INDUSTRY. Price, payable in advance, $4.00.

This is a new, revised, and enlarged edition of a book which is too well known to need much description. It contains 10,000 practical processes and formalae. It is the sort of book that, even when it does not give the exact answer to a problem which may arise in the plant, has nevertheless many suggestive and useful formulae, which can be used as the basis for experimental work. As every chemist or metallurgist knows, a starting hint of this kind will save much useless fumbling in order to get on the right track.

Among some of the subjects treated are the following: Adhesiveness; Alloys; antidotes for Poison; Brass and Bronzes, Coloring, Finishing, etc; Cleaning Preparations; Copper; Electroplating and Electrotyping; Gold Technical Applications by the Jeweler and Watchmaker; Iron, Its Treatment and Coloring; Japanning; Jewelers' Formulae; Mirrors, Silvering and Re-Silvering, etc.; Paints and Stains; Polishings; Soldering.

Structure of Crystals. By Ralph W G. Wyckoff. Published by Chemical Catalog Company, Inc. Size 6 x 9, 462 pages. Price, payable in advance, $6. For sale by THE METAL INDUSTRY.

This is monograph No. 19 of the American Chemical Society, and is divided into two parts. Part 1 covering Methods of Crystal Analysis has the following chapters under it:

The Symmetry Characteristics of Crystals.
Some Properties of X-rays.
The Interaction of X-rays and Crystals.
The Production and Interpretation of Laue Photographs.
X-ray Spectrometry and Spectrography.
Power Spectrometry and Spectroscopy.
A Generally Applicable Method for Determining the Structures of Crystals.
A Brief Historical Outline of the Development of Existing X-ray Diffraction Methods.

Part 2 on the Results of Crystal Analysis, includes the following chapters:

An Introduction to the Discussion of Existing Crystal Structure Results.
The Crystal Structures of Elements and of Metallic Alloys.
The Crystal Structures of Carbides, Oxides, Sulphides, etc.
The Crystal Structures of Halides, Cyanides, etc.
The Crystal Structures of Nitrates, Carbonate, Sulphates, Organic Compounds, etc.
Incomplete Crystalline and Non-Crystalline Diffraction Phenomena.
Some Applications of Diffraction Information.
A Bibliography of Crystal Structure Data.

The book is particularly interesting to those working with or keeping in touch with X-ray and spectrographic analysis.

Technical Papers

The Amphoteric Character of Gelatine and Its Bearing on Certain Electrochemical Phenomena,* by Per K. Frölich.

It is shown that electrochemical reactions involving gelatine (glue) are readily explained in the light of the modern knowledge of the physical chemistry of proteins. The mechanism of copper deposition from acid electrolytes containing gelatine is discussed in detail, and an explanation is suggested to account for the effect of gelatine as an addition agent in electrodeposition.

Electrolytic Theory of Corrosion,* Comments on Wilder D. Bancroft's Recent Paper on Above Topic, by F. N. Speller and F. G. Harmon.

It is shown that the electrolytic theory is the best theory of corrosion we possess today. Many cases of so-called pure "chemical corrosion" have not been correctly interpreted. Accelerated corrosion tests must be very carefully carried out, to avoid results that may be entirely different from results obtained by ordinary slow processes of corrosion.

Throwing Power, Cathode Potentials and Efficiencies in Nickel Deposition,* by H. E. Haring.

The throwing power of nickel solutions was determined by means of the apparatus previously described. The cathode potentials and efficiencies during nickel deposition were measured. The results show that the chief factor in throwing power in nickel deposition is the cathode efficiency. This is determined principally by the ratio of the effective nickel and hydrogen ion concentrations in the cathode film. All conditions which increase this ratio improve throwing power.

The Micro-Chemistry of Corrosion,* by Cecil H. Desch.

The theory of the process of corrosion is still in an unsatisfactory condition. The process is fundamentally electrolytic. Iron rust differs greatly from iron in electrolytic potential. The presence of colloids is not always essential to bring about corrosion. The author has made a microscopical study of the early stages of corrosion. A detailed description of the apparatus employed and of the method of testing alloys is given. Minute traces of foreign substances on the surface of the metal or alloy will often result in entirely different corrosion results.

Preparation of Artificial Sillimanite for Refractory Uses,* by Clarence E. Sims, Hewitt Wilson and Henry C. Fisher.

The experimental work leading to the adoption of a furnace for the preparation of artificial sillimanite (alumina and silica) is described. Clay was found to be peculiarly difficult to melt, but could be reduced to sillimanite by elimination of the excess silica. Natural sillimanite has a different composition from the synthetic product. Artificial sillimanite containing excess silica is vitreous; that with excess alumina is stony. The latter form has excellent refractory properties as compared to silica and magnesite brick. Lime is a particularly undesirable impurity.

Electric Furnace for Continuous Hardening and Tempering Wire,* by R. H. MacGillivray.

The electric furnace has proven to be an economic factor in hardening and tempering of steel wire, and has been extremely successful. Even distribution of heat throughout the furnace chamber, with absolute control of temperature at the proper point required, insures a uniformly satisfactory product and few or no rejections due to improper heat treatment. The fact that the heat is largely confined in the furnace, and not radiated into the room, has a decided effect in improved working conditions and more efficient and contented work force. Life of the furnace is considerably lengthened, and repairs can be easily and economically made, usually without the necessity of a long shut-down.

The Introduction of Carbonaceous Matter in Electro-Deposited Iron and Nickel,* by Per K. Frölich.

It has been definitely shown that carbonaceous matter may be found in electrodeposited iron and nickel, when there is not the slightest indication of any organic colloid in the electrolyte from which deposition takes place. Salts of organic acids or carbonaceous gases dissolved in the electrolyte are in many cases sufficient to account for the contamination of the deposited metal with carbonaceous matter. It is even possible to introduce such impurities into absolutely pure electro deposits of iron and nickel, by exposing these deposits to cathodic polarization in solutions containing nothing but organic salts or carbonaceous gases plus a conductivity salt. The reactions responsible for the contamination are more or less dependent upon the nature of the inorganic ions discharged at the electrodes.

Notes on Corrosion Testing by Different Immersion Methods,* by Henry S. Rawdon and A. I. Krynitsky.

The need for choosing a corrosion test which shall in some measure approximate the service conditions is emphasized and illustrated by reference to an unusual case of corrosion in a submarine cable. The general types of immersion tests, simple or total immersion and two kinds of repeated immersion, continuous and intermittent, are described and illustrated as to the apparatus needed. Test results for a series of chromium steels in immersion tests of the simple and repeated type in distilled water, as well as immersion in dilute hydrochloric acid and citric acid, are given. In general, the chromium steels are more resistant to the intermittent immersion than to simple immersion in distilled water—a phenomenon which appears to be associated with the formation of a protective film over the surface of the specimen.

Physical Characteristics of Specialized Refractories.* Part V—Thermal Conductivity of Carborundrum Refractories, by M. L. Hartmann and O. B. Westmont.

Thermal conductivity measurements up to 1,350 degs. C. of silicon carbide refractory materials have been made, using the water calorimeter method. Data were secured on furnace walls, such as those commonly used in practice, and results are believed to be accurate to within about one per cent. Conductivity measurements were made on seven carborundum single walls and on eight carborundum-fireclay composite walls. The relation of the thermal conductivity to temperature, chemical composition, and and joint effects. The conductivity of carborundum refractories was found to vary with the quantity of heat energy transmitted through the wall. Tables are given showing the coefficients of thermal conductivity and heat flow through various types of walls, with a temperature of 1,500 degs. C. in the combustion chamber.

Annealing of Brass Tubing in the Electric Furnace,* by Robert M. Keeney.

Electric annealing of small brass tubing has proven to be more economical than annealing with wood fuel at the plant of the French Manufacturing Company, Waterbury, Conn. The brass is annealed in a 330-kilowatt electric furnace having inside muffle dimensions of length, 16 ft. (4.88 m.); width 4 ft. 6 in. (1.37 m.), and height, 18 in. (45.7 cm.). The resistors, consisting of coils made of nickel chromium alloy, are mounted in the walls, roof and floor. With power at 2.33 cents per kilowatt hour and wood at $8.00 per cord, the power cost per ton of brass annealed exceeds the fuel cost by only 7.5 per cent. Yellow brass tubing in small sizes, and thin gauges can be annealed with a power consumption of 110 kilowatt hours per ton (2,000 lb.; 907.2 kg.) of tubing, or 18.2 lb. (8.05 kg.) per kilowatt hour. Lower labor costs due to greater rate of production, less time required for pickling because of much less oxidation of the brass, and no handling of wood, result in lower total costs for electric annealing.

The Influence of Emulsoids Upon the Rate of Solution of Iron,* by J. Newton Friend, D. W. Hammond and G. W. Trobridge.

Emulsoids or protective colloids exert a very pronounced retarding influence upon the rate of corrosion of iron. This retardation is due to the adsorption of the emulsoid. A possible method is suggested of treating natural and other waters, to render them less corrosive towards ferrous and non-ferrous metals in practice. In the experiments recorded, small plates of steel were suspended in solutions of lead acetate, to which small measured quantities of agar were added. The results show a marked retarding action of the agar with rise in concentration. Other steel plates were suspended in solutions of copper sulfate, containing in turn 0.05 per cent of one of a series of emulsoids. Again the emulsoids showed a pronounced retarding influence. The deposition of copper on the surface of the plate affords only little protection to the underlying metal. The corrosion loss increases with the temperature; the percentage retardation, due to the emulsoid, at first slightly rises with the temperature, but then falls. In dilute sulfuric acid and stationary plates, the retarding effect is readily detected. However, if the plates (as discs) are rapidly rotated, little protective effect is observed. Iron cooking utensils resist corrosion remarkably well. This may be attributed in part to the protective action of the colloidal food material which is cooked in these utensils.

*A paper presented at the forty-sixth general meeting of the American Electro-Chemical Society, held in Detroit, Mich., October 2, 3 and 4, 1924.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

BRUSH SILVER SOLUTION

Q.—What is a good silver solution to be applied with a brush?

A.—As a rule silver plating solutions cannot be applied by a brush; when specially prepared such solutions can be applied to brass with a sponge or soft cloth, prepared as follows:

Water	1 gallon
Sodium cyanide	3 ozs.
Silver Nitrate	1½ oz.
Gilders' floated whiting	3 lbs.
Sal-ammoniac	1 oz.

Any proportion may be made up from the above basis. Another formula that can be prepared on a pint basis, is as follows:

Water	16 ozs.
Silver trisalyt	9 pennyweights
Sodium cyanide 96-98%	9 pennyweights
Cream of tartar	20 grains
Common salt	12 pennyweights
Floated gilders' whiting	3 ozs.
Fullers earth	4 ozs.
Sal-ammoniac	56 grains

It is possible that a very soft jeweler's plate brush could be used in applying either solution to brass to produce a thin deposit of silver. Prepare both solutions in the order given, using the water as a basis.—C. H. P., Problem 3,296.

COLORING STATUARY BRONZE

Q.—We are using a formula of

Copper	90%
Tin	6%
Zinc	3%
Lead	1%

and desire to produce various permanent colors in addition to the standard dark statuary bronze finish.

We would also like to know if you advise a coating to be applied after desired color is obtained, and if so, what should be used to obtain the best results for bronze that is exposed to the elements.

A.—The three factors mostly used in the production of bronze finishes are as follows: Polysulphide, hydrosulphuret of ammonia and barium sulphide.

Either of these materials may be dissolved in water at a temperature of 120-140° F., starting with ⅛ oz. per gallon of water. The strength of the solution when applied to the perfectly clean bronze surface will determine the color. Weak solutions produce light bronze tones; stronger solutions up to ½ oz. or more per gallon of water, produce darker tones.

When the color desired has been produced upon the bronze surface, then it may be scratch-brushed dry or rubbed up carefully with steel wool. The best outdoor protection for colored bronze is wax.

Beeswax dissolved in turpentine by the aid of heat to a paste when cold is an excellent material. Apply a little to the bronze surface and then polish lightly with a soft brush or Canton flannel. Some firms lacquer the bronze surface first, then apply the wax afterwards. Large banks that have much bronze outside the banks, use the wax mixture. A very little hydrosulphuret of ammonia could be added to the wax. This material is fluid. The polysulphide and barium sulphide are in salt form. The wax mixture to which the hydrosulphuret of ammonia is added would always help to keep the original bronze tone. Another factor that can be used with water as outlined is golden sulphuret of antimony.

Water	1 gallon
Ammonia, 26°	2 ozs.
Golden sulphuret of ammonia	½ oz.

can be used as a basis and the strength increased as found desirable.—C. H. P., Problem 3,297.

DEFECTIVE JOURNAL BRASS

Q.—We are shipping you under separate cover a journal brass which you will notice has defects on the surface which has been machined. These defects do not occur to any extent in any of our castings except those similar in shape to the sample.

This casting is made with the machined side in the cope and is poured from a mixture of 77 lbs. of copper, 8 lbs. tin, 15 lbs. lead and ¼ lb. of 15% phosphor copper.

A.—On examination we find the defect to be oxide of lead caused by the casting cooling rather slowly. The defect, however, is only about 1/32 of an inch deep. The metal, when the casting is broken, shows a very good structure and homegenous mixture and we suggest to overcome this difficulty, to add 1/32 more stock to the bore and the defect will turn out. We would also suggest to overcome the slow cooling make an alloy of ½ tin and ½ nickel and use one pound of this alloy in place of one pound of tin and this will set the metal much more quickly and in all probability do away with lead sweating out.

However, there is not much wrong with your present mixture if you will add enough stock as suggested to clean the bore.—W. J. R., Problem 3,298.

EBONY AND SILVER FINISH

Q.—Can you give us the method of finishing sheet brass and cast brass articles for lighting fixtures in silver and black? We understand the process up to and including the silver plating but would like the material used to produce the black and the method of using it. We do not mean oxiding but the use of a black material to brush onto the work and rub off the high spots. Also the time of spraying.

A.—We presume you are fully familiar with the silver plating of the product you wish to finish in silver and black (commonly termed ebony and silver, or Butler antique silver) up to the point of either scratch brushing or tampico brushing the silver-plated surface. After this point is reached, dry out the silver-plated articles and then lacquer as usual. When the lacquer is dry, apply a dead black Jap-a-Lac, which can be purchased in any paint store. This should be applied with a Fitch varnish brush, or perhaps sprayed upon the lacquered silver surface. After applying, dry the articles for a few minutes until the Jap-a-Lac becomes tacky. Then remove the excess from high lights with soft cloths, moistened with a mixture of equal parts of linseed oil and turpentine. The latter materials do not have any action upon the previously lacquered surface, so re-lacquering is unnecessary.

Similar results can be obtained by mixing ivory black with gold bronzing liquid, gum and turpentine base; not the so-called banana liquid, which has a gun cotton base. The methods of procedure with the ivory black or lamp black, mixed with the bronzing liquid to a fluid paint, are identical with the Jap-a-Lac; either method will give you the results desired.—C. H. P., Problem 3,299.

ELECTRO STRIP SOLUTION

Q.—We would appreciate it if you would let us know if you have any information or books relative to the nickel plating of copper, also what is known as steel facing on copper—small size plates. We would also like to know if you have any information or books relative to how this steel facing and nickel plating can be taken off from the copper after the plates have been used, at the same time, not to destroy the designs on the plates.

A.—For detailed information covering nickel plating on copper, and also steel facing on copper, see a recent work, entitled "Electroplating and Electroforming" by Blum & Hogaboom.

This book gives full detail upon both subjects. Both nickel and iron facings upon copper plates can readily be removed by using the following electro-strip.

The same current conditions are used as in electro-plating, ex-

cept that a reverse current is used. The plates to be stripped are made the anode; heavy sheet lead or copper is used as the cathode, and should exceed in surface area, the copper plates to be stripped.

Electro Stripping Solution:

Sulphuric Acid 66°	1 gallon	Voltage
Water	1 pint	4 to 6
Glycerin	1 oz.	

The solution will absorb water from the atmosphere, so add only the original amount.—C. H. P., Problem 3,300.

FOUNDRY ON TOP FLOOR

Q.—We contemplate installing a brass foundry for bathroom fixtures, sufficiently large enough for eight moulders. Will you please give us your opinion as to what floor will be most practical in a two-story building or a three-story building?

A.—In our opinion, whether you desire a two-story building or a three-story building for a foundry, the top floor should be used for the foundry department, as it is necessary to have ventilation above all, where eight moulders are employed.

It would not be practical, and would be a mistake to install a foundry in any building where ventilation could not be had in the roof.—W. J. R., Problem 3,301.

METAL FOR BRINE SOLUTION

Q.—Kindly write us by return mail what mixture of metal will make a good casting and non-corrosive. We want something that will not be affected by the brine solution of the ice cream. The metal is to run about ⅛ inch thick and about 6 feet long, at an angle. This casting must be also very strong and durable to stand a lot of banging.

A.—The mixture we would suggest to meet your requirements is, 89 parts copper, 10 parts aluminum, 1 part 30% manganese copper. This metal runs well and is as strong as mill steel. However, it requires experience in casting to obtain good results. If you handle this mixture like manganese bronze you will find very little difficulty in casting.—W. J. R., Problem 3,302.

METAL POLISH

Q.—We wish to know if you can furnish us with a formula for a metal polish. We repair and clean bicycles and the plating on them is very dirty. What we want, is a strong solution that will polish the nickel parts quickly, when gone over with a cloth.

A.—We suggest the following formula for metal polish, suitable for your purpose.

Carbon tetra chloride.....	3½ gallons
Naptha or benzine.....	4 gallons
Ammonia 26°	2 lbs.
English floated gilders' whiting....	5 lbs.
Finely powdered silica	14 lbs.

This polish will cut all you want; if it cuts too much, increase the whiting and decrease the silica. It makes a non-inflammable polish. You can use gasoline or benzine for the entire formula if you want to do so; the polish will then be a regular metal polish.—C. H. P., Problem 3,303.

OXIDIZING COPPER AND BRASS

Q.—Can you give us any information that might be of aid to us in regard to oxidizing copper and brass products?

A.—Presuming that your brass and copper products are absolutely clean and bright, such as would result from acid dipping or ball burnishing if followed up with a mild alkaline hot cleaner, then the copper articles could be oxidized in the following solution:

Water	1 gallon
Polysulphide	¼ oz.
Water ammonia	1/32 oz.

Temperature 160° F.

Following the oxidizing dip, the articles should be thoroughly washed in cold and boiling waters, and finally dried out with maple wood sawdust or by the aid of a centrifugal dryer. Brass articles can be oxidized black in the following solution: manipulations in drying, etc., as above.

Water	2 gallons
26° Ammonia water	1 quart
Pure copper carbonate	16 ozs.
Sal soda crystals	4 ozs.

Temperature 140° F.

To prepare the solution, dissolve the soda crystals in the water. Dissolve the copper carbonate in the ammonia, then mix with the water and soda. A bright black finish can be obtained upon brass in a few moments. If the black does not deposit and the brass shows a dirty tone instead of black, then add just a little more copper carbonate to the solution at intervals until the black tone is satisfactory. In "Platers' Wrinkles" you will find many other formulae that can be used to advantage in coloring your product.—C. H. P., Problem 3,304.

RECOVERING BABBITT

Q.—How can I eliminate babbitt from brass chips? What is the best way to do this job without going to the expense of putting in a reverberatory furnace. Can it be done in crucibles and by poling the metal. To what extent does babbitt injure brass?

A.—One way to remove babbitt that is mixed with brass chips, is to sweat the babbitt out of the turnings by charging the chips in a sweating furnace and let the tin, lead and antimony melt and run out from the chips, applying only enough heat to melt the babbitt. Unless there is at least 10% babbitt in the chips, it would not pay, as under that amount, the recovery of the babbitt would be small, on account of the babbitts sticking to the small particles of brass and not running out freely. Very little would be eliminated from the chips. The best method is to run the chips down into ingot, have an analysis made of the ingot recovered and add the necessary new metal to make a mixture of 80 copper, 10 tin, 10 lead, and .25 phosphorus, using one-half pound of 15% phosphor copper. We would suggest that you keep the antimony contents down to .25.

As you intend making motor bushings the above mixture is one that is very satisfactory for this class of work.—W. J. R., Problem 3,305.

SMOOTH BRASS INGOTS

Q.—We are desirous of making smooth top brass ingots with a convex top. Ours are somewhat concave. Can you advise me what conditions are necessary to make the top convex?

A.—The general practice on making smooth top brass ingots with a convex top is to pole the mixture, and it is generally a mixture of 80% copper, 10% tin, 10% lead. Cover the mixture with a pine block or a cast iron plate that will cover the mold leaving only a place to pour.—W. J. R., Problem 3,306.

TIN PLATING ON STEEL

Q.—Will you kindly advise us what kind of plating is on the enclosed article.

A.—The sample chaplet submitted for finish is presumably made from steel and electro tin plated after tin plating. The chaplets such as your sample are tumbled in bran or hardwood sawdust to produce a bright finish.

A tin solution for plating should be prepared as follows:

Water	1 gallon
Sodium stannate	1½ lbs.
Soluble tin salt	4 ozs.
Powdered starch	⅛ to ¼ oz.

Anodes: either all steel, or steel to which pure tin anodes are attached. Temperature of solution: 180° F. Voltage: still solutions, 2 to 3; mechanical, 3 to 6.

What is termed "tinning by contact" is frequently used in tinning small steel articles such as your sample. The method is as follows:

In an oblique tumbling barrel, place 5 gallons of water; add 32 fluid ozs. of sulphuric acid. Place the steel articles to be tinned therein; tumble for a few minutes first, then add 6 ozs. tin chloride and 3 lbs. of scrap sheet zinc.

In a short time the steel articles will be perfectly tinned and bright; remove; wash and dry thoroughly. To keep the solution in working condition add a few ozs. of chloride of tin to each batch of work, as may be required; scrap zinc as it is consumed, and a small amount of sulphuric acid when required to keep up the deposition of tin. This method is used in tinning tacks, nails, etc.—C. H. P., Problem 3,307.

PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST

1,510,067. September 30, 1924. **Rust-Dissolving Liquid.** Erik J. Norberg, Everett, Wash.

A composition adapted to penetrate and dissolve rust, comprising in its larger proportion an acid liquid, a smaller proportion of crystalline burning acid such as carbolic acid, and a pungent and mobile liquid obtained by wood distillation.

1,510,116. September 30, 1924. **Polishing or Buffing Device.** Arthur Lee Van Meter, New Orleans, La.

A device of the character described, comprising a casing, a motor therein having a shaft extending therefrom and through the casing, a lever mounted upon the inner wall of said casing, a collar carried by said shaft adapted to be engaged by the one end of said lever, a handle for said casing, and means carried by said handle adapted to be manipulated for causing the lever to engage or disengage said collar upon the shaft for the purpose described.

1,510,242. September 30, 1924. **Alloy and Apparatus Made Therefrom.** Aladar Pacz, Cleveland Heights, Ohio.

A metallic alloy for the purpose described, consisting essentially of copper at least 87%, silicon between 2% and 5%, and of least 1% of aluminum.

1,510,541. October 7, 1924. **Electrode.** Charles Lalor Burdick, New York, N. Y., assignor to Chile Exploration Company, N. Y.

An electrode resistant to anodic disintegration and made up of an alloy containing copper, silicon, iron, and lead of such a composition that the relationship between the copper, silicon and iron in the alloy may be expressed as a mixture of copper silicide (Cu_2Si) and iron silicide (FeSi).

1,510,586. October 7, 1924. **Machine for Forming Metal Tubes.** Leonard D. Davis, Erie, Pa.

A machine for forming seamless tubes from pierced billets, comprising a mandrel to receive a pierced billet, means to cause longitudinal movement of the mandrel, and a succession of forming devices to act upon the billet and through which the billet is carried by the mandrel, certain of the intermediate forming devices having in each a supplemental groove to form on the billet a longitudinal bead and the last of the forming devices being substantially circular in form as to their working faces and having no supplemental groove, whereby clearance between the billet and the mandrel is effected as the billet leaves the machine.

1,510,902. October 7, 1924. **Die for Die Casting.** Herman Rau, Hamilton Beach, N. Y., assignor to Doehler Die-Casting Co., a Corporation of New York.

An adjustable die for pressure casting comprising, in combination with an ejector member, a bottom plate through which the ejector member passes, and side pieces on the outer face of the plate arranged to enclose an impression block space and adjustable to vary the dimensions of the enclosed space.

1,511,025. October 7, 1924. **Sand-Blasting Apparatus.** George W. Christoph, Warehouse Point, Conn.

In a sand blasting apparatus, the combination a work chamber in which the sand blasting operation takes place, said chamber having an outlet at the bottom thereof through which the sand flows by gravity in a thin stream, a work support in said chamber above said outlet, a nozzle for directing a blast of sand against the work in said chamber, an air jacket surrounding the lower walls of the work chamber, said lower walls being provided with an air passage connecting said jacket with the work chamber.

1,511,194. October 7, 1924. **Process of Uniting Metal.** John B. Austin, Cleveland, Ohio.

The process of uniting metals, one of which has an oxidized surface, which comprises melting one of the said metals in contact with the other metal having an oxidized surface and in the presence of a reagent capable of removing the oxide from the surface of said other metal, and continuing the application of heat until the reagent removes the oxide from the surface of said other metal, and the two metals unite.

1,511,195. October 7, 1924. **Process of Uniting Copper to Steel.** John B. Austin, Cleveland, Ohio.

The process of uniting copper bonds to steel rails which comprises positioning a copper bond adjacent to a steel rail, confining the bond in a composite mold having carbon and copper parts in contact with the bond, melting copper into a casting cavity of the mold by means of an electric arc, commingling therewith a reagent capable of removing oxides from the copper and from the surface of the rail with which the copper contacts, heating the copper to a temperature at which the reagent may remove the said oxides, and maintaining the copper at such temperature until the reagent has removed the said oxides and the copper has united with the bond and rail.

1,511,196. October 7, 1924. **Process of Uniting Metals.** John B. Austin, Cleveland, Ohio.

The process of uniting a copper bond to a steel rail which comprises forming a suitable mold cavity about a portion of the copper of a bond adjacent to a rail, of which mold cavity the base and web of the rail form mold walls, respectively, melting copper into the mold cavity, directing a heating flame on the molten copper within said cavity without directing the flame on the steel and maintaining the copper molten until the gases are substantially eliminated and the copper unites with the steel of the web of the rail and the bond and forms a non-porous junction between the copper and the steel.

1,511,197. October 7, 1924. **Process of Uniting Copper to Steel.** John B. Austin, Cleveland, Ohio.

The process of uniting one metal or alloy to another of higher melting point which comprises melting a small quantity of the one metal and holding the molten metal in contact with the metal of higher melting point at the location where it is desired to effect a junction, heating the molten metal by directing the flame upon the said metal of higher melting point and continuing the heating of the molten metal until the gases are substantially eliminated and a substantially non-porous junction between the two metals is effected.

1,511,215. October 14, 1924. **Nozzle for Atomizing Molten Metal.** John H. Calbeck, Joplin, Mo., assignor to The Eagle-Picher Lead Company, Cincinnati, Ohio.

A nozzle for atomizing molten metal comprising in combination a conduit for the molten metal having an opening at its end and a casing enclosing the conduit spaced away from it to form a dead air chamber and having formed in it outside of said dead air chamber a conduit chamber for air under pressure terminating in an air nozzle formed to direct an air jet against the melted metal issuing from the open end of the molten metal conduit.

1,511,349. October 14, 1924. **Machine for Forming Brass Spring Strips for Radiators.** George H. Lober, Toledo, Ohio.

In a machine for forming strips, a stationary die, a ram, a pair of dies connected to the ram, one of the dies movable relative to the ram, compression springs located intermediate the movable die and the end of the ram for positioning the strips relative to the stationary die and for holding the strips while the other die connected to the ram co-acts with the stationary die to shape the sheet material, a pair of rollers for feeding the strips over the stationary die, and means operated by the ram for releasing the rollers.

1,513,119. October 28, 1924. **Electrodeposited Article and Method of Making the Same.** Charles P. Madsen, New York, N. Y., assignor to Madsenell Corporation, New York, N. Y.

A method of electrodepositing metals which comprises rotating the cathode at such an angular velocity and with such a portion of the same exposed to a gaseous medium that successive portions of the electrodeposited metal will be exposed to said medium more than a predetermined "minimum" period, so as to permit hydrogen in the metal to be dissipated.

1,513,349. October 28, 1924. **Method of Sherardizing.** Otho V. Stewart, Wilkinsburg, and Leon McCulloch, Pittsburgh, Pa., assignors to Westinghouse Electric and Manufacturing Company, a Corporation of Pennsylvania.

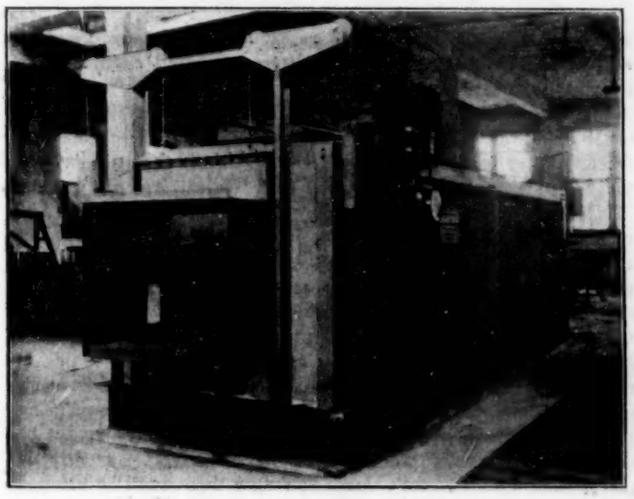
A method of coating metal which comprises heating the same for a predetermined length of time in the presence of zinc dust containing substantial amounts of iron, the temperature being proportional to the iron content of the dust.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

CONTINUOUS ELECTRIC CORE OVENS

The F. A. Coleman Company of Cleveland, Ohio, has made a very interesting installation of a Continuous Electric Core Oven at the Ferro Machine & Foundry Company, also of Cleveland. The oven is constructed so that it can be moved wherever building conditions permit.



CONTINUOUS ELECTRIC CORE OVEN

The outer walls are all 9" thick of Nonpareil Insulation brick, manufactured by the Armstrong Cork & Insulation Company, constructed on a heavy structural steel frame work and substantially tied together without the use of through metal. The outside walls of the brick work are finished smooth with FAC cement which gives them a hard protective coating. The oven is 26' long, 7' wide over all and weighs, without cores and plates, 35,000 pounds.

The electrical equipment was furnished by the Westinghouse Electric & Manufacturing Company and consists of a number of 5 KW heaters (located in the space underneath the roll conveyor), a door switch used as a safety device, a push button station for throwing the power off and on the oven by hand and a motor operated snap switch single section control panel which is mounted on the outside of the oven as shown by the photograph.

A Tycos Thermostat, synchronized with a Brown Recording Thermometer, automatically controls the oven temperature up to its limit of 500° F., the operating temperature of the oven is 450° F. and at this temperature the drying time of the cores is about five minutes. A Buffalo Baby Conoidal Fan circulates the heated air, the fan and connecting ducts being heavily insulated with Nonpareil brick.

Insulated doors at each end are adjustable to various heights so as to cut down the entrance and exit openings to a minimum as various sizes of cores pass through.

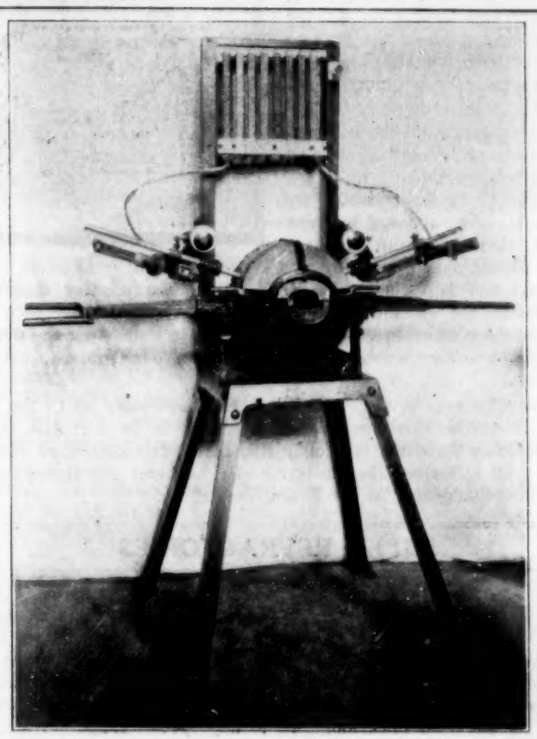
Using insulation brick as a solid slab in heavy structural steel framing and then assembling these slabs without any through metal, is exclusively an F. A. Coleman oven construction. F. A. Coleman oven doors are also made in the same manner. It avoids the use of steel sheets which rust out; it also permits taking the oven apart and moving it if this becomes necessary. The solid brick slab construction is much superior to panels formed of steel sheets and filled with powder or disconnected pieces of filler, since these forms of insulation have no strength and must be protected. The steel sheets used for protection expand under heating and leave the insulation filling unsupported; foundry vibration, due to molding machines, vibrators and cranes, acts on the friable insulation and tends to gradually disintegrate the filling which sifts to the bottom of the panels, producing heat shorts through the panels.

SMALL ELECTRIC FURNACES

The Booth Electric Furnace Company, of Chicago, has developed two new small production electric furnaces. These furnaces are inexpensive and suitable for small production or experimental work.

One furnace is of the ladle type and has a ladle which can be acid or basic lined as desired. The melting is done in the ladle which can be lifted off after the charge is melted and carried by the shank handles provided to any place convenient for pouring The capacity of this furnace is from 20-30 lbs. for steel and steel alloys, and up to 50 lbs. for cast iron, copper and brass. Good yellow brass has been made in this furnace containing 35% zinc, the metal loss in melting being about 3%. The upkeep cost of the furnace is very small, replacement of ladle linings costing only about $1.00 and the electrode consumption averaging about 5 cents per hour of melting. The furnace can be used with direct ore or indirect ore.

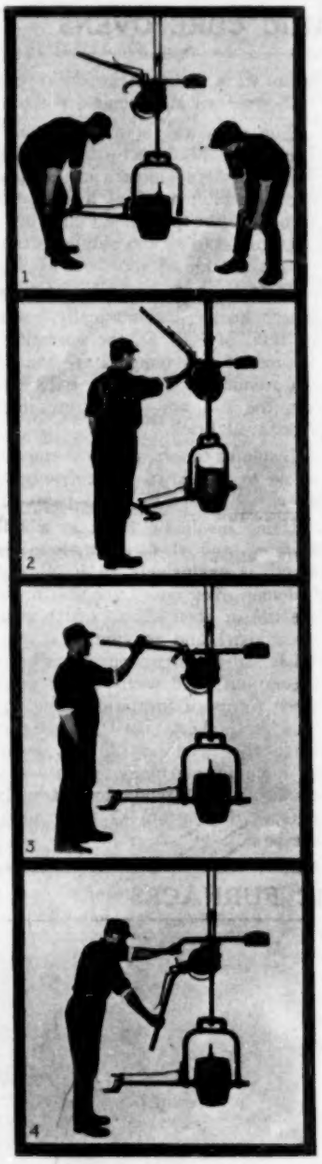
The second furnace is of the tilting type and has a capacity of 100-200 lbs. per charge. This furnace can be used for the melting of steel, steel alloys, iron, copper or brass. The furnace can be acid or basic lined as desired and an extra shell can be supplied which can be lifted on and off by means of a small crane when it is desired to change from one melting to another. The electrodes can be inserted either in a vertical or a horizontal position giving either direct or indirect arc melting as desired. The furnace tilts by hand mechanism, tilting 45 degrees forward and 35 degrees back. The tilting mechanism operates very rapidly and it is possible to oscillate the furnace if it is desirable to obtain a movement of the charge being melted. Heats of steel can be melted in about 1¼ to 1½ hours and a slagging door and pouring spout is supplied to facilitate handling of the slags and ready inspection of the bath.



BOOTH TILTING ELECTRIC FURNACE—200 LB. CAPACITY.

CRUCIBLE POURING DEVICE

The Modern Pouring Device Company of Port Washington, Wis., manufactures a device for the easy and safe pouring of metals. The illustration shows the method of handling.



The crucible is raised six inches by one complete stroke of the raising lever and is held at any desired height by a brake and ratchet mechanism. Raising the crucible in this manner is a good deal faster than with a chain block or any other chain apparatus.

In lowering, the operator brings the raising lever up over the cutout so that the latch on the lifting ratchet dog will engage the latch pin and hold the handle stationary. The whole load is now carried by the brake. By bearing down on the brake weight lever (Fig. 2), he relieves the brake, whereupon the load lowers, the speed of lowering depending on the amount of force he exerts on this lever.

In lowering a crucible full of metal, it is advisable to employ another means of lowering. By bearing down on the latch release lever (Fig. 3), the dog engaging the raising ratchet is released and the raising lever can be lowered the full extent of the stroke without raising the load and when so lowered the operator releases his hold on the latch release lever. He then bears down on the brake weight lever with the right hand. The load suspended on the machine will force the raising lever upward and by taking the resistance of the load with his left hand on this lever (Fig. 4), the operator can lower the load to any desired height. This can be repeated any number of times.

All load raising and sustaining parts are made of cast and wrought steel, making it a comparatively light and sturdy machine. An automobile type brake, sheltered from the heat by a special shield, is used. The crucible shank is likewise made of steel and is forked at the end, offering a positive means of control by the operator. It has a direct-acting, positive lock for locking the shanks to the bail frame while transporting the device. This locks automatically as the crucible is brought into an upright position.

This apparatus is made for all sizes of crucibles up to the No. 200. It can be furnished with a 2 ft. 2½ ft. or 3 ft. lift, the 2 ft. lift being standard. Crucible shanks for crucibles from No. 40 to No. 90 inclusive take the same size bail and can therefore be used interchangeably in the lifting device.

SUPER REFRACTORIES

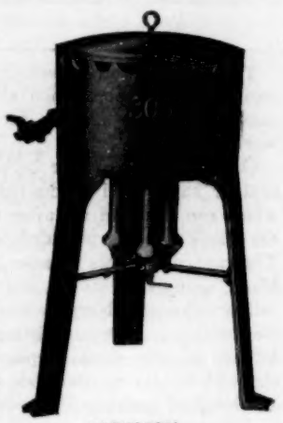
The Lava Crucible Company, of Pittsburgh, has put out a new line of furnace specialties. This new line consists of complete refractory equipment for metal melting furnaces. It includes both crucible and non-crucible furnaces. It covers such items as crucible furnace covers, crucible base blocks and special lining shapes for all types of non-ferrous furnaces. The latter they make either to standard dimensions, or to any special shape desired, by the user, on order. They also furnish customers mixed material of the same type for such concerns who desire to ram in their own linings. Results on the above articles are said to have been highly pleasing, and where they have been tried, they have been sold again on the basis of quality and service costs.

The main feature of attraction claimed is that they will give long life, that they have greater strength than the old style structures, and thus are not subject to breaking out and cracking. They maintain full linings which means economy in fuel consumption, and maintained speed of melting. Where linings, covers, etc., burn away, the combustion chamber is greater, the fuel used is more, and the speed of melting is considerably lessened. This is an item of saving which the user ordinarily overlooks, because it is not apparently a tangible one, and one whose costs can be allocated. The refractories are made of the new group of super-refractories, which have higher temperature resistance, greater resistance to erosion and abrasion and much greater physical strength at high temperatures.

The Lava Crucible Company is also manufacturing standard brick and brick shapes, applicable to all fields where super-refractories are used. It is held by this company that the day for the use of super-refractories on a large scale is rapidly coming. The possibility for their use is so much greater than the old low resistance types, that it will not be long before they are very generally used. There is no doubt that they are initially more expensive, but their service more than warrants them. They believe, that this will be a great boon to the melting industry, particularly the non-ferrous melting industry, with which they have the most intimate contact. When one eliminates refractory difficulties in non-ferrous furnaces, one has solved one of the foundrymen's biggest problems, and has put him well on the way to reducing his costs of production. There are so many savings that can be affected in the use of proper refractories, that cannot be directly placed, that a melter really does not realize them, until he has had experience with them.

JOHNSON MELTING FURNACE

The Johnson Gas Appliance Company, of Cedar Rapids, Iowa, is putting on the market a new soft metal melting furnace called No. 305 Johnson Melting Furnace. This furnace is specially made for melting lead, tin, type metal, stereotype metal, white metal, babbitt, solder, aluminum, and all other low or medium fusion metals and alloys. It can also be used for cyanide hardening, oil tempering, and melting of various chemicals.



JOHNSON
NO. 305 FURNACE

The distinguishing feature of the Johnson furnaces is the fact that they do not require a forced air blast. They are said to be strongly constructed, and as rapid as a blast outfit without attendant difficulties of manipulating the blast.

The No. 305 furnace has 3 large size Johnson Patented Direct Jet Bunsen Burners with shut-off valves and pilot lights. An added feature of this furnace is the bottom outlet valve for drawing off the molten metal very easily.

Its height is 31 inches overall; weight, complete, 185 pounds; has a removable cast iron melting pot 13 inches in diameter, by 7 inches deep with a capacity of 300 pounds. The gas consumed is 85 cubic feet per hour.

DUREX BEARING MATERIAL

Durex bearing material, as generally supplied, is an absorbent copper-tin-graphite bronze. The absorbent properties are due to the presence of extremely small pores, the volume of which can be controlled in the process of manufacture. These pores, by reason of their interconnection, can, through

capillary action, maintain a flow of lubricant to the bearing surface.

Metallurgically, the metallic portion of Durex is composed of the alpha crystals of copper-tin solid solution such as make up the matrix of ordinary bearing bronzes, the graphite, in a finely-divided state, being distributed throughout the bronze and interlocked between the metallic crystals. The structure of the material is such that it will not gall a steel shaft, even though no lubricant be present.

The porosity of the material and its consequent capacity for the absorption of lubricant (which may be either liquid or grease) may be varied to suit the particular demands of any definite service. Generally, the material as supplied for bearings is one of two grades: with porosities of 25 and 15 per cent by volume and elastic limits in compression of 2,000 and 4,200 pounds per square inch, respectively. The composition of the two types is identical, the only difference being in the porosity.

In the application of this metal for bearing service, the journal diameter and length are calculated by the same considerations as govern the design of other bronze bearings. Wall thickness may be varied to suit the particular conditions of the installation. Generally, a bushing of Durex may replace any conventional bronze bushing with no necessity of change in proportions.

The fundamental advantages of the material, when used to replace conventional bronze bearings, may be summarized as follows:

1 Self-oiling to the extent of the quantity of lubricant contained in the bearing or added to it, providing uniform distribution of the lubricant over the bearing surface. This makes possible longer operation without attention to lubrication. In bearings carrying light loads, the oil originally impregnated in the bearing may suffice for lubrication over the effective life of the machine.
2 Non-galling, the structure of the metal preventing seizure of the shaft and bearing even when lubrication has been grossly neglected.
3 Low rate of wear, due to even lubrication over the bearing surface.
4 Great reduction in seepage of lubricant from the bearing.
5 Constancy in dimensions, as compared with non-metallic impregnated bearing-materials.
6 A broadening of the field of bearing materials by permitting use of alloys and mixtures not now considered available because of difficulties in machining.

These advantages are available in Durex, with no added cost over that of conventional bronze bearings.

In the manufacture of Durex, powdered metals, graphite and pore-forming materials, intimately mixed, are compressed into the desired form in dies and held to shape by compression. The formed bushing is then sintered for several hours at high temperature, resulting in the formation of a bronze that is identical with one of similar composition made by conventional melting processes, with the added advantage of porosity. After sintering, the bushing is brought to correct dimensions by simple automatic operations, the character of these making possible the maintenance of any desired tolerances.

Durex is made by the Moraine Products Company, of Dayton, Ohio.

WINDOW CLEANER

A cleaner for foundry and factory windows is being marketed by the Skybryte Company of Cleveland, Ohio, which is highly recommended for plants which are subject to much dust and dirt, like brass foundries. The method of application is to coat the window by means of a brush with this liquid cleaner, and then flush with water using a hose or any other convenient method. It is stated that rust, soot, and carbon scale are dissolved immediately and that Skybryte is harmless to paint, putty or wooden sash.

A single gallon is said to be sufficient to clean 800 square feet of dirty glass, and one unskilled laborer can clean 5,000 square feet per day.

FOUNDRY BEFORE CLEANING

FOUNDRY AFTER CLEANING

EQUIPMENT AND SUPPLY CATALOGS

"Solith"—A folder on artificial resin, sold by Gomperz & Company, Hamburg, Germany.

Non-Corrosive and Heat Resisting Steels—A booklet issued by the Crucible Steel Company of America, New York, covering its stainless steels.

Ferro-Manganese and Ferro Silicon—A folder on 80 per cent Ferro-Manganese and 50 per cent Ferro-Silicon, sold by Frederic B. Stevens, Detroit, Mich.

Ingots, Performance vs. Perhaps—Issued by the Ajax Metal Company, Philadelphia, Pa. A neat little booklet on the properties and advantages of Ajax ingots.

Small Die Casting Machine—A folder from R. E. Byrd, Erie, Pa., on a bench die casting machine, hand operated for small items like desk novelties, paper weights, etc.

Apothecaries Hall Anniversary—An elaborate little book, very interestingly written and illustrated, issued by the Apothecaries Hall Company, Waterbury, Conn., in commemoration of its 75th anniversary. This book traces the history of the company from its inception to the present day.

Woodworking Machines—Catalog No. 402 C, issued by J. D. Wallace & Company, Chicago, Ill., on their portable direct motor drive woodworking machines for use in pattern shops, etc.

High Resistance Indicating Pyrometer—Bulletin No. 330 issued by the Bristol Company, Waterbury, Conn., describing Model 420 pyrometer, a new model, which supersedes Model 319.

Automatic Buffing and Polishing Machines—A booklet has been put out by the Acme Manufacturing Company, Detroit, Mich., covering Acme Automatic Buffing and Polishing Machines. It contains good photographs of the machines in operation.

ASSOCIATIONS and SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

AMERICAN FOUNDRYMEN'S ASSOCIATIONS

Headquarters, 140 South Dearborn Street, Chicago, Ill.

Resolutions unanimously adopted at the Twenty-sixth Annual Meeting of the American Foundrymen's Association, Milwaukee Wisconsin, October 15, 1924:

Resolved: That the American Foundrymen's Association extends to the good people of Milwaukee in general, and to the Milwaukee Metal Trades and Founders Association, and the Milwaukee Association of Commerce in particular, its deep appreciation of the generous hospitality accorded to its members and guests. To the men and women constituting the various local committees, who were untiring in their efforts to make this visit notably enjoyable, special thanks should be accorded. To the Hotels, to the Management of the Milwaukee Auditorium, and to all other agencies and individuals, who contributed to the entertainment and comfort of the members and guests of the American Foundrymen's Association in attendance at this convention, deep appreciation is extended.

APPRENTICE TRAINING

Resolved: That the American Foundrymen's Association views with favor the methods pursued by the Milwaukee Vocational School in the training of foundry apprentices and commends to its members the establishment of similar schools in their respective communities.

TECHNICAL PROGRAM

To the authors and committee workers for the convention the casting industry of the world owes a debt of gratitude, and the American Foundrymen's Association votes its acknowledgment of this debt, and extends to them its great appreciation and thanks for their contributions, which record further advances in the art of founding.

EXHIBITS

To the manufacturers who contributed to the success of the convention with their exhibits, the American Foundrymen's Association feels deeply indebted and hereby expresses its appreciation and thanks.

APPRECIATION

Behind the activities of this great association is an executive organization whose only compensation is the constantly increasing success of this leading body of casting manufacturers of the World. The men constituting this executive staff have been untiring in their zeal; they have given generously of their time to the conduct of the affairs of the association. They have guarded its finances with the same care and with that same degree of conservatism that they surround their own private affairs. Therefore, let us express to our retiring president, G. H. Clamer, to our former vice-president and president-elect, L. W. Olson, and to our board of directors, our great appreciation of their efforts, by a rising vote of thanks.

Resolutions respectfully submitted by
Resolution committee
A. O. BACKERT, Chairman,
W. R. BEAN,
V. E. MINICH.

INSTITUTE OF METALS DIVISION

Headquarters, 29 W. 39th Street, New York.

DR. BENEDICKS' LECTURES

Dr. Carl Benedicks, director of the Metallographic Institute, of Stockholm, Sweden, is to deliver the annual lecture before the Institute of Metals Division, of the American Institute of Mining and Metallurgical Engineers, at its annual meeting, the third week in February, 1925. In connection with this lecture, Dr. Benedicks will visit and lecture at several of the leading universities of the United States.

The subject of his lecture before the Institute of Metal Division is A Fundamental Factor Influencing the Rapid Corrosion of Boiler and Conderser Tubes, and Some Kindred Metallurgical Subjects.

AMERICAN ELECTRO-PLATERS' SOCIETY

NEW YORK BRANCH

Headquarters, care of J. E. Sterling, 468 Grand Ave., Long Island City, N. Y.

The New York branch of the American Electro-platers' Society now meets every 2nd and 4th Friday of each month, in the World building, Park Row, New York City.

President Fischer presided at the October meetings. A request from the Detroit Public Library for a copy of Manual published by New York branch was granted. L. J. Jenning was reinstated as a member. Applications for membership were received from J. C. Boyer and J. Halas.

Mr. Styrus, of New York branch, read an interesting paper on Metal Cleaners, Their Production and Values. The following plating problems were discussed: Silver Plating Reflectors; Methods of Stripping Nickel off Iron and Brass; the Causes of Silver Anodes Becoming Dark While Solution is Operating; Methods of Picking Iron and Steel.

An open meeting was held at the new meeting rooms in the World building, Park Row, New York City, November 14, 1924. U. Schneider spoke on Metal Cyanide Plating Solutions. His interesting paper was followed by a lengthy discussion, participated in generally by the large audience present.

PHILADELPHIA BRANCH

Headquarters, Care of George Gehling, 5001 Edmund St.

The afternoon session of the Philadelphia Branch banquet was very well attended. W. M. Scott was in charge of the evening. The address of welcome was given by George Gehling, president of the branch, and other speakers included C. H. Proctor, Professor Graham and F. T. Taylor.

A very interesting moving picture was shown by a representative of the Baltimore Copper Smelting and Rolling Company of Baltimore, Md., showing the sources of supply of copper and all the operations involved in turning out electrolytic copper in its various shapes. This company also makes copper anodes.

After the educational session, there was an intermission which was spent in renewing old acquaintanceships which was followed by the banquet at 7:30.

This banquet was the best ever held by the Philadelphia Branch. The attendance broke all records, totalling 165. The committee which managed the banquet surprised all of those present by having the St. John's Orchestra, 36 pieces, to furnish the music for the occasion.

It was a big time for everybody in every way, educationally and socially.

CLEVELAND BRANCH

Headquarters, Care of H. S. Kneeland, 3024 Clybourne Avenue

The Cleveland Branch is running a membership campaign, and hopes to enlist all the platers in northern Ohio.

The secretary will be glad to send information and applications to all those interested. Write to H. S. Kneeland, at the above address.

COPPER AND BRASS RESEARCH

Headquarters, 25 Broadway, New York.

The fourth annual meeting of the Copper & Brass Research Association was held at 2:30 o'clock, November 6th, at its officers, 25 Broadway, New York City. The following were among those elected members of the board of directors, the first five comprising part of the executive committee: Edward H. Binns, president, C. G. Hussey & Company; F. S. Chase, president, Chase Companies, Inc.; John A. Coe, president, American Brass Company; C. F. Kelley, president, Anaconda Copper Mining Company; H. J. Rowland, secretary

and sales manager, Rome Brass & Copper Company; Henry F. Bassett, president, Taunton-New Bedford Copper Company; Carl F. Dietz, president, Bridgeport Brass Company; B. Goldsmith, president, National Brass & Copper Company; E. O. Goss, president, Scovill Manufacturing Company; U. T. Hungerford, chairman board of directors, U. T. Hungerford Brass & Copper Company; A. B. Seelig, manager, Michigan Copper & Brass Company.

At a meeting of the board of directors the following officers were elected: President, R. L. Agassiz; vice-presidents, C. F. Kelley, F. S. Chase, Walter Douglas, H. J. Rowland, U. T. Hungerford; treasurer, Stephen Birch; secretary, George A. Sloan; manager, William A. Willis.

Following the meeting R. L. Agassiz, president of the association, issued a statement summarizing the improved condition of the copper industry, due to the increased domestic consumption of copper.

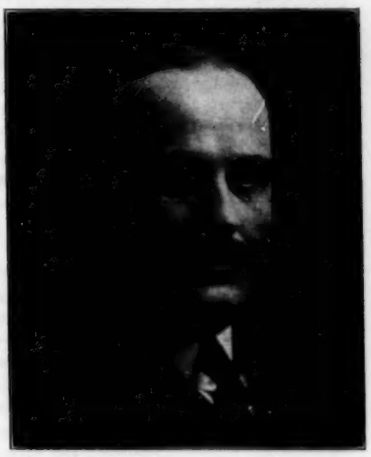
Among those now comprising the membership of the Copper & Brass Research Association are the following companies: American Brass Company, Bridgeport Brass Company, Chase Metal Works, Waterbury Manufacturing Company, T. E. Conklin Brass & Copper Company, Inc., Dallas Brass & Copper Company, U. T. Hungerford Brass & Copper Company, C. G. Hussey & Company, Merchant & Evans Company, Michigan Copper & Brass Company, National Brass & Copper Company, New England Brass Company, The J. M. & L. A. Osborn Company, Richards & Company, Inc., Rome Brass & Copper Company, Sandusky Foundry & Machine Company, Scovill Manufacturing Company, Taunton-New Bedford Copper Company.

Personals

WILLIAM H. BARR

William H. Barr has been president of the National Founders' Association since 1913. During his administration, this association has become one of the most progressive and influential manufacturers' organizations. The activities of the association are directed primarily to the development of the foundry business, but under President Barr's leadership it has been in many movements for the stabilization of labor conditions in general industry and economic education of the public.

With this in mind, Mr. Barr accepted the presidency of the American Motion Picture Corporation of New York, an organization that covers the non-theatrical field. He is convinced that the motion picture offers the most powerful means for the spread of correct information on industrial and manufacturing matters, and sees in this enterprise the greatest modern agency for the enlightenment and education of the general public.



WM. H. BARR

As a manufacturer, Mr. Barr is president and general manager of the Lumen Bearing Company, which has modern plants at Buffalo and Youngstown. This company he organized, and through his executive ability and capacity for organization, it has become one of the recognized leaders in the development of metals and the manufacture of brass castings.

Mr. Barr is a vice-president of the National Association of Manufacturers, member of the National Industrial Council and the National Industrial Conference Board. He is also a member of the Sons of the American Revolution, the Social Committee of the Episcopal Church and the American Society of Mechanical Engineers. His hobbies are farming and horses. He has a model farm at Derby, N. Y., and is Master of Hounds at the Lake Shore Hunt Club.

Lawrence M. Brile has joined the National Smelting Company, Cleveland, Ohio, where he will make his headquarters. Mr. Brile has been connected with aluminum smelting companies for the last 15 years in the sale of aluminum ingots.

Lancaster P. Clark, has been appointed manager of the metal department of Warner Bros. Company, Inc., Bridgeport, Conn. He was formerly New York Representative of the Waterbury Farrel Foundry & Machine Company, Waterbury, Conn.

Bruce Products Corporation, Detroit, Mich., has taken on an additional salesman in Chicago, **J. W. Van Valkenburg,** who will specialize on Bruko buffs and polishing compositions in the Chicago territory, and Mr. Westrip will specialize on Bruko metal cleaners.

F. H. Bourke has been appointed Michigan representative by the American Nickelloid Company, Peru, Ill. Mr. Bourke has served many years in the capacity of salesman and is widely known among the metal and allied trades. His office is at 1577 Cadillac Avenue, Detroit, Mich.

Glenn D. Evans, for many years connected with the J. F. Buhr Machine Tool Company, has again joined the Buhr Organization, in the capacity of chief engineer. Mr. Evans has been chief engineer of the Climax Engineering Company, of Los Angeles, for the past three years.

Dr. William Blum addressed the Connecticut Valley Section of American Chemical Society, at Hartford, Conn., on November 8, 1924, on the subject, "Recent Advances in the Electro-Deposition of Metals." **George B. Hogaboom** has been elected chairman of the Connecticut Valley Section.

F. B. Wilson, chemist with the Atlantic Insulated Wire & Cable Company, of Stamford, Conn., has been transferred to the plant of the Rome Wire Company, in Rome, N. Y., to take charge of raw materials, testing and all rubber control work. The equipment of the Stamford plant will be moved to a new location as a branch of the Rome plant.

Roland A. Wirfs, formerly president of R. A. Wirfs Refractories Company, St. Louis, Mo., and sales agents for Hytempite, has become associated with the Keystone Refractories Company, of New York. Mr. Wirfs will be general sales manager for Durastix in the western district, with temporary office at 4609 McMillian avenue, St. Louis, Mo.

W. W. Sly, founder of the W. W. Sly Manufacturing Company, Cleveland, Ohio, recently celebrated his 50th year in business. Mr. Sly's first interest in the metal world consisted of the devising of a spring fastener for harness. He organized the Cleveland Malleable Iron Company, which later became the National Malleable & Steel Castings Company. In 1874 he established a jobbing nickel plating plant, one of the earliest of its kind in the middle-west, and did considerable business with stove manufacturers, finishing their trimmings for them. Later on he developed a tumbling barrel for cleaning before plating, and put out the first five-pointed hard iron stars used in foundry cleaning operations. He also developed a dust arrester of the cloth type which has made great headway in the foundry industry. Sand blasting apparatus followed and this line has grown to be one of the most important made by the Sly company. From a single room, the plant of this company has grown until now it cover several city blocks. It is controlled by the Sly family and managed by the following officers: S. C. Vess, president; G. J. Fanner, vice-president; M. A. Sly, secretary; G. P. Steele, treasurer; F. W. Klatt, general manager; F. A. Ebeling, sales manager; G. A. Boesger, chief engineer; E. L. Bottomley, superintendent.

George A. Henderson, consulting engineer, with the Ordnance Department, U. S. Army, has resigned to go into private practice in New York City, his office being located at 51 West 66th street. He will specialize in safety methods as applied to construction, industrial plants and celluloid, chemical and explosive manufacture.

On Monday night, November 3rd, R. A. Weaver, editor of the Enamelist and president of the Ferro Enamel Supply Company, Cleveland, gave a dinner at the University Club, of Cleveland, in honor of R. D. Landrum, vice-president of the Vitreous Enameling Company, of Cleveland, and also president of the American Ceramic Society. The following men who are interested in enameling were present at the dinner: R. D. Landrum and John Grainer from Vitreous Enameling Company; H. D. Cushman, J. D. Henry, H. C. Luebbert, and R. L. Williams, of the Ferro Enameling Company; Carl W. Mehling, of the American Radiator Company, of Buffalo; Paul Francais, of the National Division, of the American Stove Company; L. W. Manion, of Canton; F. B. Prentice and H. F. Chrisman, of the Massillon Refractories Company, Massillon, Ohio; C. A. Blackburn and H. E. Barker, of Cleveland Metal Products Company; R. A. Weaver, H. E. Ebright, Paul Quay, H. L. Brooks, E. L. Stine, A. T. Davis, J. E. Rumer, Major W. Mavor nad R. A. Nelson, of Ferro Enamel Supply Company; H. E. Johnson, of Cincinnati Enameling Company; F. F. Allen, of Enamel Products Company; W. H. Wilson, of Lewis-Shepard Company; S. M. Jenkins, of Celite Products Company; F. Q. Thorpe, of Brown Instrument Company; H. M. Richards, of American Rolling Mill Company, and J. C. De Vol, of A. B. Stove Company.

Deaths

FRANK P. WELTON

On September 10, 1924, Frank P. Welton died from injuries received when struck by an automobile in Hackensack, N. J., on September 9. Mr. Welton was born on August 25, 1865, in Northheld, Conn. At the age of 18 years he started to learn the casting trade under his father, Herschel O. Welton, at Benedict and Burnham's. Six years later on the death of his father, he succeeded as boss of the casting shop, and continued as such until 1906. It is stated that many old timers say that there was never a casting shop to equal Benedict's up to that time. At one time there were ten Weltons casting at Benedicts.

During 1906 and 1907 he was active with Abe Kenworthy and Robert Somers in organizing the Waterbury Rolling Mills, Inc., serving as treasurer until he left in 1915 to go with the Seymour Manufacturing Company, Seymour, Conn. He left there in 1916 to take charge of the casting shops of the Stamford Rolling Mills Company at Springdale, Conn. For the past seven years Mr. Welton was the Eastern representative for the Jonathan Bartley Crucible Company; and for the past two years he had made his home in Hamden, Conn.

Mr. Welton was a 32nd degree Mason. Burial was at Waterbury, Conn., by Clark Commandery No. 7. He is survived by his wife, one son and two daughters; also two sisters and one brother, Charles E., of the Waterbury Rolling Mills.

HERBERT OGDEN HYATT

Herbert Ogden Hyatt, president and treasurer of the Brass Goods Manufacturing Company, Brooklyn, N. Y., died October 31, at his home in Amityville, L. I.

Mr. Hyatt spent the greater part of his life in Brooklyn where he was born on December 13, 1859. While quite young, he went with the Brass Goods Manufacturing Company, but leter left to go with the Lackawanna Railroad. After remaining with the railroad two years, Mr. Hyatt returned to the Brass Goods Manufacturing Company, with whom he remained for 40 years. With his brother Frank S. Hyatt and Alfred E. Bruns, he started the Metal Package Corporation of New York. He held the presidency of this firm from 1910 to 1917, when he retired from it. Mr. Hyatt was deeply interested in motoring and yachting. He was a member of the Amityville Yacht Club of Long Island. He leaves a widow, Catharine A. B. Hyatt; a son, Herbert Ogden Hyatt, Jr., and a daughter, Mrs. Alfred Raboch.

JOSEPH E. ELLISON

Joseph E. Ellison, whose death was noted in our issue of November, 1924, was born in Jamestown, N. Y., February 18, 1875. Mr. Ellison was an expert metallurgist, and was a member of the Board of Directors of the Ellison Brass Manufacturing Company, Jamestown, N. Y. His first position was in a bicycle factory. Later, he entered the employ of the Art Metal Construction Company as an engineer, and shortly after became foreman of the Library Stack Department. In 1913 he became associated with his brothers in the Ellison Brass Manufacturing Company, taking charge of the melting department and remaining in that position until his death.

JOHN WILLIAM EARLE

John William Earle, chairman and managing director of Earle, Bourne & Company, Ltd., of Birmingham, England, died in Birmingham after a long period of ill health on November 3rd. His firm was founded in 1874, and Mr. Earle had been connected with it from his boyhood. He had been managing director since 1897. During the war he served as chairman of the Rolled Metals Association and did valuable work in stimulating the production of cartridge metal. From the early days of the Institute of Metals he was an active promoter, frequently attending the meetings. Having many attractive personal qualities, his death is regretted by a wide circle of friends.

JOHN E. POTTER

John E. Potter died at the Masonic Home, Utica, N. Y., October 11th, following a prolonged illness. He was formerly president of the National Aluminum Works, Elmira, N. Y., but for the last few years retired.

NEWS OF THE INDUSTRY

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

WATERBURY, CONN.

DECEMBER, 1, 1924.

Reports of another big merger of brass plants here and elsewhere, and possibly one or two copper mining companies have been in circulation for many months, but reached their climax during the past few weeks, when it was confidently asserted that such a merger would be a working proposition before the end of the year. Publication of such a report, however, has brought statements from the heads of the local industries involved to the effect that such a merger is neither practical nor expedient at the present time and the question of is advantages locally is still an open one.

The report had it that the **Scovill Manufacturing Company**, the **Chase Companies**, of this city, the **Bridgeport Brass Company**, of Bridgeport, the **Rome Brass Company**, of Rome, N. Y., the **Detroit Cooper and Brass Rolling Mills**, of Detroit, and one or two copper companies, probably the **Calumet** and **Hecla Copper Companies**, would figure in the combine for the purpose of offsetting the advantage, if any, gained by the consolidation of the **Anaconda Copper Mining Company** with the **American Brass Company**.

"Interesting if true," was the first comment made by **E. O. Goss**, president of the Scovill Manufacturing Company, regarding the report, adding:

"Such discussions as have been had, as yet, have not dis-

closed that such a merger is either practical or expedient, and until such a disclosure is made as the result of a complete examination it is not a matter of legitimate news comment."

"As you know, there have been many rumors in the past relative to mergers of one sort or another among the brass and copper mills, including our own," said **F. S. Chase,** president of the Chase companies, in answer to the report. "Naturally, the possible advantages and disadvantages have been informally considered by the Officers of our companies at various times. The matter is still an open question in our minds.

"Should the time come when it might seem feasible and desirable we should have in mind in any action we might take the conservation of certain ideals which have always been associated without business development. We should expect our company to retain its identity and relative importance in the brass business and to give due and proper consideration to the interests of the locality and our employees."

The general impression seems to be that negotiations for a merger along some such lines as suggested are now in process but apparently no agreement, even tentative, has been reached by the representatives of any of the companies involved and negotiations have not reached a stage where any sort of a proposition can be presented to the director. It is known that local brass leaders feel such a combination is necessary in the near future in order to have brass mills in each section of the company to supply the needs of such sections and eliminate the expense of shipping all orders from Waterbury. It seems doubtful if any copper mining company will figure in such a merger, for heads of local industries cannot see how they would benefit by merging with a copper company, although copper company would benefit greatly by being insured of a steady market for its product. The local independent brass mills do not have to hook up with any copper company to insure a steady supply of copper at a reasonable price. They can buy on the open market just as advantageously and perhaps more so for if joined to a copper company they would have to buy at the market price from such a copper company as the latter could not afford to sell any less than at the market and the brass company would have the disadvantage of having to buy from the same copper company all the time.

Waterbury, the brass center of the world, is soon to have brass letter boxes. Twelve brass boxes, such as the post office department is trying out in various places, will be shipped here from New Orleans. The manufacture of brass letter boxes was undertaken recently by the government at the navy yards as an experiment, at the suggestion of the Copper and Brass Research Association, in which most of the local concerns hold membership. The first installation of such boxes was in Atlantic City, N. J. They were designed primarily for use in seaport cities and towns, where the prevailing dampness causes more rapid corrosion of the cast iron boxes than in the inland cities.

The American Brass Company will hang up a new high record of output in the 12 months to end next December, and its production of manufactured material will amount to more than 500,000,000 pounds, it is reported. The Anaconda rolling mills at Great Falls, Mont., will turn out in addition sufficient to make Anaconda's total sales of brass and copper fabrications, 650,000,000 for the 12 months. This output is in excess of last year, which was the biggest 12 months in point of volume of material manufactured in the history of the company.

Misinformation exists as to the Anaconda's copper production cost in Montana, reports issued by the local office state. The company's reports do not specifically mention this figure, but it is stated authoritatively that including expenses of every character and crediting silver as usual to the operating account, its cost is 10 cents per pound. Including depreciation, it is about 10½ cents, a figure considerably under what has been claimed by those who thought they knew the facts. The Chile Copper Company, controlled by Anaconda, is making the best cost records in its history, turning out $18,000,000 pounds of copper a month against 17,000,000 pounds in the first part of the year and the cost per pound, including depreciation, is well under six cents a pound landed in New York. It will soon be producing 20,000,000 pounds a month, the report states.

The sum of $88,952 has just been paid the Chase companies, Inc., by the United States Government as a refund for an over-assessment on the corporation's tax of 1917. The companies paid in 1917, a total tax of $119,014.04. This was on an original assessment of $118,762.78, together with a later assessment of $251.26. The corporation claimed it had been over-assessed and filed application for rebate.

John H. Goss, vice-president and general superintendent of the Scovill Manufacturing Company, heads the list of a committee of business men throughout the state, who have signed a petition urging the delegates to the senatorial convention, this month to nominate Congressman John Q. Tilson as Republican candidate, to succeed the late Senator Frank B. Brandegee.

A large delegation of local manufacturers intend to attend the annual meeting of the manufacturers' Association of Connecticut, in Hartford, this month.—W. R. B.

BRIDGEPORT, CONN.

DECEMBER, 1, 1924.

The local plant of the **Bassick-Alemite Company** and the local stockholders of the company will not be affected by the $34,000,000 merger of the **Stewart-Warner Speedometer Corporation** and the Bassick-Alemite Company, it is stated at the local offices of the company.

According to the schedules of the **Bridgeport Iron & Metal Company** filed with **Referee John Keogh,** of the bankruptcy court, the total liabilities amount to $651,211.06 with estimated assets of $325,816.99. A composition offer of 15 per cent has been made to the creditors of this company and the creditors of the **Acorn Trading Company,** of New York, by **Attorney David Slade,** of New Haven, counsel for the two concerns. Of this, 10 per cent will be paid in cash and five per cent on promissory notes payable in two years. The offer was made at a meeting of the creditors before Referee Keogh for the purpose of naming a trustee. Henry Greenstein, temporary receiver, was named trustee, but with the understanding that if the offer is accepted at the next meeting he will not qualify as trustee and no extra fee will be charged by him. Most of the attorneys present were from New York, and the apparent disposition was to accept the offer. Attorney Slade said the offer was made on the basis of the report of the investigating committee. The cause of the financial trouble was due to the trade depression and the fact that when obligations became due the owners sold stock to raise money and lost heavily by doing so.

Charles Smollan, president of the **Lorraine Novelty & Manufacturing Company,** of New Jersey, has advised the local Chamber of Commerce that the firm's plant in Jersey City will be moved to Bridgeport and start operating here soon after Dec. 1, with 350 employes, in a leased section of the building owned by the **Columbia Phonograph Company.** The company has for some months operated a small plant on Remer street as an experiment, employing some 50 workers. The experiment proved so successful that in spite of the fact that the company owns its Jersey buildings it has found it more profitable to move its plant here to a leased building. There are 15,000 square feet of floor space in the new plant and 4,800 in the Remer street plant. The company makes metal novelties for the popular price chain stores. The acquisition of the plant is the result of the activity of the Chamber of Commerce to locate more desirable industries here.

The possibility that the Columbia Phonograph company of this city will form a connection with the **Radio Corporation of America,** whereby the products of the latter will be sold in conjunction with the reproducing phonographs is under consideration, according to **Robert F. Crudginton,** general manager of the local company.

Suit is now being heard in the United States Court in New Haven which has been brought by the **Remington Cash Register Company,** a subsidiary of the **Remington Arms,** of **Bridgeport,** against the **National Cash Register Company.** The Remington company alleges that the other has infringed certain patents which were brought by the plaintiff from a German inventor and registered with the United States Patent Commissioner. The Remington company seeks an order of restraint and a judgment of damages computed on the number

of machines made and sold by the National Cash Register Company on the alleged infringed patents.

Practically all the factories of the city have joined in a campaign for a Community chest for the coming year. Each plant has a captain who will appoint a canvasser for each 20 employes. They will not solicit cash contributions, but will ask contributors to sign pledges to be paid in installments, which will start not later than January. Luncheon will be served to the canvassers daily at the Stratfield throughout the campaign and reports will be made at this luncheon.—W. R. B.

TORRINGTON, CONN.

DECEMBER, 1, 1924.

The post-election improvement in general conditions affecting the metal industries is already being felt here. Additional orders are coming in and most of the plants are operating on full schedules. Instead of ordering in large quantities at one time, as was the practice in the past, however, dealers for the most part are cutting down on the size and ordering more frequently. This seems to be true in nearly all lines of manufacturing. Deliveries of raw materials are being made promptly and the general situation, as a whole, is both satisfactory and promising. Few new workers are being taken on, but on the other hand, none is being laid off. The increase in brass prices has had no appreciable affect on operating conditions.

The **Torrington Company** recently sold its plant in Chicopee, Mass., to **Morris Asinof & Sons**, clothing manufacturers, of New York. The Torrington Company vacated this factory earlier in the year, concentrating its manufacturing operations at Torrington. The price paid for the Chicopee plant is said to have been about $100,000.

The report that **Charles F. Brooker**, formerly of Torrington, dean of brass manufacturers, might be a candidate for the Republican nomination for United States senator from Connecticut to fill the unexpired term of the late **Frank B. Brandegee**, was received with deep interest in Torrington and the general sentiment of men in all walks of life was that Mr. Brooker would make an ideal senator if the could be induced to accept the honor.

A community campaign was conducted during the past month to raise a fund of $7,500 for general expenses of the **Charlotte Hungerford Hospital** during the ensuing year. **Uri T. Hungerford** promised to give the additional $7,500 needed for the work on condition that the public gave an equal amount. the ready response made to the appeal indicated the appreciation of Torrington people of the splendid institution which was given by Mr. Hungerford as a memorial to his mother.—J. H. T.

NEW BRITAIN, CONN.

DECEMBER, 1, 1924.

Election over and a Republican administration, undoubtedly favorable in its policies to New England manufacturing, conditions among the metal manufacturing concerns in this city are pointing to a successful winter. In practically all of the larger factories here work is considered very satisfactory and a steady increase during the coming months is expected.

There have been no unusual upsets during the past month, and the only business change of importance is that the **Stanley Works** withdrew several hundred hands from rented factory room in the **New Britain Machine Company** plant and installed them in their own recently completed building. This however, does not entail any change in personnel, number of employes or policies, it is explained. The Stanley Works is at present doing a good business. **Landers, Frary & Clark** are having night shifts in some departments to keep abreast of orders. This pertains especially to the electrical goods and such cutlery and table hardware as is in demand for the holiday trade.

The **P. & F. Corbin** factory, which has been making one of the best showings of any concern in this district, continues on about the same basis, finding a ready market to absorb its builders' hardware output. The **Cabinet Lock** branch and the **Russell and Erwin** and **Corbin Screw Corporation** divisions of the **American Hardware Corporation** also are showing good balance sheets, and sales are reported as very good. The slow but steady improvement that has been noted at the **Traut & Hine** factory during the past few months continues. The firm is said to be in a much better financial condition, and its production also is reported as gaining. Sales are being boosted, and it is reported that one or two new lines are to be added presently. The **North & Judd Manufacturing Company** shows little change and business there is good. The **New Britain Machine Company** likewise continues to forge slowly ahead after its several years of depression. Looking forward to the winter, it may be predicted that business will continue good and stimulation in several lines is expected, especially the builders' hardware branch.—H. R. J.

PROVIDENCE, R. I.

DECEMBER, 1, 1924.

The **H. M. H. Company**, of Pawtucket, manufacturers of rosaries and other ecclesiastical goods, have purchased the factory building on Bagley street, occupied by it for a number of years, and also a large tract of land adjoining. The business was established in 1911, and now occupies about 15,000 feet of floor space, but contemplates in the near future the addition of considerable more space. The officers are Daniel I. Hayes, president and treasurer and Thomas H. Bride, general manager.

The **Rhode Island Rug Works** has recently added an extensive automobile lacquering department to its plant at 168 Harrison street.

According to records filed at the city clerk's office, John B. Granger is the owner of the **La Favorita Company**, that has started in business at 155 Chestnut street, manufacturing a line of enameled toiletware articles.

J. C. Brady Company is the name of a new firm of electroplaters that has started at 82 Clifford street, of which Joseph C. Brady, who has been identified with this branch of the jewelry industry for a number of years, is the the proprietor.

The **Platnide Company** has recently removed from 19 Calender street to larger quarters at 5 Mason street.

One factory in Attleboro is running a night and day shift, and has found it necessary to seek greater floor space in another building and has orders on hand sufficient to keep day and night forces at work up to the first of the new year with prospects of greater expansion thereafter. It is the **Larson Tool & Stamping Company**, of Oliver street. The concern has orders ahead for special stampings on radio parts which insure continuous operation of the double forces for several months. Meanwhile, there are in abeyance several other orders which indicate that work will be carried on at such speed for months to come in the new year when the orders are finally placed. The company has recently taken additional space in the annex of the Watson Company building, on Mechanic street, and is faced with the prospect of having to enlarge its present plant to much greater capacity in the near future.

The **Boston Sheet Metal Works, Inc.**, has been granted a charter under the laws of Rhode Island to conduct business in Providence with a capital stock of 500 shares of common stock without par value. The incorporators are Samuel Goldberger, P. Weisman and S. Mason, all of Providence.—W. H. M.

MIDDLE ATLANTIC STATES

ROCHESTER, N. Y.

DECEMBER, 1, 1924.

Stimulated by election results, business presents a firmer front among Rochester's industries. The sentiment is 100 per cent better, and it is safe to estimate that industry has advanced fully twenty per cent in activity during the last month.

It was said today that not a brass or metal molder of any description is now idle in Rochester. During the past summer brass molders were much depressed over lack of employment, and a number of them obtained work at other callings. A majority of these men who deserted the brass molding trade

have not returned to the foundries. However, all the brass foundries in the city are now operating at full time and normal working conditions.

Manufacturers are of the opinion that the coming year is going to be one of great prosperity in industrial lines. They do not anticipate an immediate boom with the advent of the New Year, but expect a gradual increase in production until full speed is reached.—G. B. E.

TRENTON, N. J.

DECEMBER, 1, 1924.

Conditions in the metal industry in Trenton are very promising and manufacturers are looking for a good winter as far as production is concerned. Hardware jobbers are reported to be light on stocks and are already placing orders for goods to be delivered after January 1. This means that the manufacturers will be kept busy during the winter months. Immediately after the close of the presidential election business began to pick up and there was a noticable increase in orders. **William G. Wherry,** president of the **Skillman Hardware Manufacturing Company,** recently returned from an extended trip through the mid-west, visiting Pittsburgh, St. Louis, Louisville, Ky., and other business centres. He says he found jobbers very optimistic over the future and with considerable prospective building for the early spring.

George E. Maguire, treasurer of the **E. H. Freeman Electric Company,** has purchased from the **Waterbury Clock Company** the **Ingersoll Watch Factory,** in Trenton. It is said that the consideration was in the neighborhood of $100,000. The watch factory consists of an entire block of land and the plant was built years ago by the Trenton Watch Company and was renovated at tremendous cost in recent years by Robert H. Ingersoll & Brother. The plant comprises 40,000 square feet of floor space. The watch factory was taken over by the Waterbury Clock Company about a year ago, the latter being one of the heaviest creditors of the Ingersoll Watch Company, which at that time went into the hands of receivers.

The **Bertrand F. Miller Company** has been chartered at Trenton with $25,000 capital to manufacture radio supplies. The incorporators are Bertrand F. Miller, Elmer D. Dugan and Ellis L. Pierson. The company will take over the plant by that name, which recently went into the hands of a receiver.

Plating Press Works, 1245 Frelinghuysen avenue, Newark, N. J., has been incorporated with $200,000 capital to manufacture all kinds of copper, tin, zinc, lead, brass, bronze and all ores and minerals. The incorporators are J. Alfred Baker, E. Douglas Baker and Merhan H. Kopf, all of Newark, N. J.

The **Kayess Manufacturing Company,** of Newark, N. J., has been incorporated with $10,000 capital to manufacture metal goods of all kinds.

Breather Needle Company, Summit, N. J., has been chartered with $7,500 to manufacture carburetor needles.

Summit Radio Manufacturing Company, East Orange, N. J., has been chartered at Trenton with $50,000 capital to manufacture radio supplies.

Keystone Stamping Corporation, Irvington, N. J., has been incorporated with $15,000 to engage in metal stamping.

Lowndes, Gomez & Lowndes, Inc., has been chartered at Trenton with $150,000 capital to deal in various kind of metals.

The plant of the **New Jersey Lamp Manufacturing Company,** Trenton, N. J., was gutted by flames on November 19, resulting in a loss of several thousand dollars. The loss is covered by insurance. One of the employees was attempting to thaw out frozen pipes when sparks from the torch ignited a can of liquid composition used in finishing lamps. An explosion shook the building and the factory was gutted despite the hard work of the firemen.—C. A. L.

PHILADELPHIA, PA

DECEMBER 1, 1924.

Merchants in the metal industries in the Philadelphia district are thoroughly satisfied with the result of the national election and now have resumed their business with the assurance of a continuation of the policies of the government, rather than a change which would have been imperative with a new administration, attended with the not improbable reductions in tariffs and a radical change in the price structure of the market. With all the uncertainties removed there has been a slight increase in trade during the last few weeks. Prices are firmer with stronger tendencies believed to be in the not distant future.

Building construction continues to progress more than ever. New contracts are being placed for the erection of office buildings and home site developments are being planned everywhere in the suburbs. All these are unmistakable signs of better business for the metal trades as there is an increasing demand for better pipes and fixtures for offices and homes. People are gradually appreciating the economies in buying materials, of a better grade with the double insurance of quality and durability. The educational campaigns of the national associations apparently have been efficacious.

Prices no longer are the determining factor in sales, merchants report. There were a few months not long ago when metals could not be sold at any price. Buyers simply were out of the market for obvious reasons. But the comparative stability of the entire market has proven to them that the low point of the curve had been reached and that now an upward reaction is in progress. Yet purchases are not being made far in advance.

Copper prices are firmer and the demand increasing, after a rise and fall in demand. The lead market condition is stronger than last month, but has been unchanged in the last week. Buyers are displaying little interest in antimony and there is an appreciable decline in price. Zinc which followed the general trend of events after election with a rise of $4 a ton has dropped $2. Tin sales are spotty, but the market is stable with slight advance during the last week.

During the last month scrap metal sales have not been as great as was expected. Merchants expected that the resumption of business with the close of summer would tend to be a strong influence in purchases and sales. But neither of these have materialized to any certain degree of encouragement.

Platers are enjoying the usual rush of work associated with Christmas goods. Most of the orders will be completed about the middle of the month. A great portion of the holiday trade already has been filled.—A. F. C., Jr.

MIDDLE WESTERN STATES

DETROIT, MICH.

DECEMBER, 1, 1924.

The **Retrievable Trolley Base & Manufacturing Company** has recently been incorporated at Monroe, Mich., with a capital stock of $25,000, to do a general machine business in metals. The stockholders are Frank H. Heck, Vallie W. Dussia and A. C. Van Hooydonk. The address is 623 West Front street, Monroe.

The **Unique Brass Manufacturing Company,** 5450 West Jefferson avenue, manufacturers of brass parts for the automobile industry, is now reported operating nearly to capacity with 140 men on its payroll. This organization operates a smelter of its own where scrap metal is reclaimed, a forging plant where materials are punched into desired shapes and a machine shop where machine work is done on rough castings. **Robert Grace** is president; **John Grace,** vice-president and **George Grace,** secretary and treasurer.

The brass, copper and aluminum concerns in Detroit and surrounding territory will close the year in about the same condition as those engaged in other lines. The last six months or more have been quiet—particularly so as a presidential election was on. Now that this is over a decided optimistic tone is indicated everywhere, but notwithstanding this fact, business thus far has not shown the improvement that was generally expected. The one redeeming feature about the situation is the optimism which is met on every side. In this territory, particularly, much depends on the automobile industry. That at present, while somewhat improved, is not reaching the proportions predicted for it a few weeks ago.

Price cutting already has started and still further reductions are expected in order to stimulate sales. Almost every one now believes that a decided improvement will be noted directly after the annual automobile shows which are scheduled for January.

Manufacturing jewelers here are not experiencing a very brisk business. Most of them are largely engaged on repair work.

Robert Crawford, president of the **Atlas Foundry Company,** has been made chairman of the local committee in charge of arrangements for the American Foundrymen's association convention which will be held at the state fair grounds Coliseum at Detroit in 1925.

Detroit is determined to get its share of the aircraft industry just the same as it has of the automobile industry. With this idea in mind the city has recently decided to acquire a large acreage by condemnation proceedings, if necessary, along the Detroit river front for a landing field. Then again the completion is announced of a new airplane field at Dearborn, a suburb of Detroit, by the **Ford** interests. Added to this the **Stout Metal Airplane Company** has recently completed a new factory, the first in the country, it is said, to be devoted exclusively to the production of commercial airplanes and dirigibles. This factory is within the limits of the new **Ford** landing field at Dearborn and is now being equipped preparatory to the production of the Stout metal airplane. The new air landing at Dearborn is a donation on the part of the Fords in the interest of commercial aviation. The **Ford Motor Company** has no intention of entering the airplane industry, other than to watch its developments as has recently been announced.

The **McCoy Bronze Company** recently began operations at its new plant at Forsythe and Holden avenues in Detroit, after a two-weeks' shutdown while installing machinery.—F. J. H.

CHICAGO, ILL.

While a marked change is still lacking in the metal industry in the Chicago region, business is beginning to move with a greater momentum and the local metal dealers expect that in a short while conditions will be quite gratifying.

Barney Cohen, district director of the United States Employment Service, recently completed an extensive tour of Illinois, Michigan, Wisconsin, Indiana, and Ohio, and reported that improvement is being registered in most branches of industry, save in some automobile centers where the usual seasonal decline is at hand. In the Chicago industrial district, Mr Cohen's report specifically declares a gradual improvement in the metal trades. In the smaller cities, conditions are bettering, and the general trend in typical Illinois communities and those of nearby states is toward a definite advance, as far as employment is concerned.

R. G. Raphael, sales manager of the **Federated Metals Corporation,** stated that they are experiencing their best business for some time. Similar conditions were reported from the **Western Metal Company.**

Just how important a factor in the metal business has been the advent of the radio was impressively brought to the attention of all local metal people during the third annual Chicago Radio Show, held at the Coliseum, from November 18 to 24. The show was crowded to capacity each night of the exhibition with spectators constantly viewing the booths of more than 250 exhibitors.

Frank J. Kerr and **U. J. Hermann,** managers of the show, reported that many of the exhibitors had obtained record contracts. According to best statistical information at hand, the expenditures for radio parts (the greater portion of them metal), during the year 1924, will exceed $250,000,000. This represents an approximate increase of more than $100,000,000 over the preceding year.

An early morning fire of unknown origin recently damaged the foundry of the **Holland Brass Works,** 618 West Monroe street, to the extent of $1,500. For a short period, the fire threatened several other metal concerns in the same building.

Louis Birkenstein, president of the **Globe Metal Company,** returned with his wife on November 16, from a European tour of several months.

Ivan Reitler, vice-president of the **Federated Metals Company,** made a two-week trip to New York on business in the latter part of November.

Charters for the following corporations have been recently issued by the Secretary of State of Illinois: The **Cosgrove Jewelry Company,** 424 South State street, to deal in gold, silver, platinum, alloys, with a capitalization of $25,000. The incorporators are Charles Westen, Joseph Samuels and Joseph Silverberg.

Krauth & Reed, Inc., 186 North La Salle street, to engage in the retail and wholesale manufacture of Jewelry. Capital, $1,000. Incorporators are Adele Krauth, Marion Zajac and Harry Krauth.

Willmack Chemical Products Company, 6122 Broadway, to manufacture and sell chemicals, electrical batteries. The capital is $50,000, and the incorporators are H. H. Williams, L. B. McCarthy and Ann E. McCarthy.—L. G. H.

Business Items—Verified

Novelty Casting Company, Brooklyn, N. Y., has opened a plant at 1166 Cypress avenue, Ridgewood, Brooklyn.

Guaranteed Buff Company, Inc., 161 Mulberry street, New York, will move December 15th to 192 Water street, Brooklyn, N. Y.

M. Freidus, dealer in metal working machinery has removed from 210 Centre street, New York, to new building at 201 Centre street.

F. C. Brand Company, dealer in foundry and pattern supplies, is now located at 253 Broadway, New York. This firm carries in stock a full line of pattern letters.

Harshaw, Fuller & Goodwin Company, Cleveland, Ohio, has awarded contract for the construction of two chemical factories, 51 x 164 ft. and 28 x 46 ft., on Newburgh avenue. Estimated cost $40,000.

On account of increased business the **Ferro Enameling Company,** 4150 E. 56th street, Cleveland, Ohio, has just completed the erection of a new fireproof warehouse, which has a capacity of over 1,000 barrels of enamel.

The **Kenosha, Wis., Die & Stamping Works, Inc.,** has increased its capital stock from $10,000 to $25,000, and is preparing to enlarge its plant and equipment. This firm operates the following departments: tool room, stamping.

Davis & Cox, 321 Jefferson Avenue, Miami Beach, Fla., are in the market for plating machinery, and wish to get in touch with some manufacturers of plating equipment. This concern contemplates going into the plating business.

Walter C. Gold of Philadelphia notes the marked increase in the use of emery in this country, and corroborates a statement made on page 428 of THE METAL INDUSTRY for October, 1923, under the caption, "Abrasive Materials in 1923."

Bruce Products Corporation, Detroit, Mich., has taken up new office and warehouse space at 711 W. Monroe street, Chicago, Ill., and ample stocks of all classes of polishing materials will be carried on hand at the Chicago warehouse.

Hoyt Metal Company, Eastern avenue and Lewis street, Toronto, Canada, contemplates the erection of a new plant to cost $250,000. This firm operates the following departments: smelting and refining; brass, bronze and aluminum foundry.

The **Hoover Company, Ltd.,** Hamilton, Ont., Canada, is now occupying building recently erected. This firm operates the following departments: aluminum foundry, tool room, grinding room, plating, japanning, stamping, polishing, lacquering.

A. C. Klopping, 1678 Norwood avenue, Toledo, Ohio, manufacturer of metal stampings, will build a one-story addition, 41 x 97 ft. DeVore & Company, Toledo, are the architects. This firm operates the following departments: tool room, stamping.

The **W. A. Fuller Company,** Greensburg, Pa., has purchased

a building at a cost of $25,000, into which the general offices and headquarters have been moved. Sulphur Products Company will be housed in the same building. Wilfred S. McKeon is president of both companies.

Phillips & Clark Stove Company, Inc., Geneva, N. Y., operator of gray iron, brass and aluminum foundries, has changed its name to Andes Range & Furnace Corporation. This firm operates the following departments: brass foundry, grinding room, casting shop, plating, jappaning.

Benedict Manufacturing Company, East Syracuse, N. Y., is in the market for a number of second-hand durion tanks of 500 or 600 gallon capacity. This firm operates the following departments: tool room, grinding room, casting shop, spinning, plating, stamping, tinning, soldering, polishing, lacquering.

The **Moore Enameling & Manufacturing Company,** succeeds the West Lafayette Manufacturing Company, West Lafayette, Ohio. This plant formerly manufactured exclusively high grade enameled ware. The plant under the new organization will continue to manufacture enameled kitchen utensils for the time being.

C. D. Whalen, of the **California Plating & Manufacturing Works,** 1146 Union street, San Diego, Calif., has sold his entire interest of one-half to J. E. Wier, and has no further connection with the concern. This firm operates the following departments: grinding room, galvanizing, brazing, plating, japanning, polishing, lacquering.

Judge Garvin of the Federal Court, Brooklyn, N. Y., on November 14th issued a temporary injunction against the **Superior Spray Company,** New York, N. Y., restraining this firm from violating the patents of Smart, the exclusive sales rights of which is controlled by the **Eureka Pneumatic Spray Company,** Richmond Hill, N. Y.

The **Triangle Electrical & Machinery Exchange,** formerly located at 511 Broadway, Brooklyn, N. Y., is now located at 183 Centre street, New York City, with larger space in the new machinery building just completed. This concern deals in new and used motors, dynamos, and metal working machinery as well as a full line of plating apparatus.

Freemont Aluminum Castings Company, Fremont, Ohio, is the name of the former Hotz Foundry & Manufacturing Company, which is in bankruptcy. The plant and equipment of the latter company have been leased by the former from the trustee. This firm operates the following departments: brass, bronze and aluminum foundry, brass machine shop.

The **Forsberg Manufacturing Company,** Bridgeport, Conn., is considering the installaion of a plating department in connection with its other business, which consists of stamped metal goods, dies and tools, saw frames, builders' hardware, and electrical supplies, and would like to get in touch with firms in this line to get information about plating methods, etc.

The first unit of the new $175,000 3-story reinforced concrete addition to the **Chandeysson Electric Company's** plant, St. Louis, Mo., is nearing completion. The addition, when completed, will be 360 feet long, 52 feet wide and 50 feet high and is equipped with a 30-ton crane and served by a spur of the Missouri Pacific Railroad, which enters the center of the building.

Oakley Brass Foundry Company, successor to the Triumph Brass Foundry, Oakley, Cincinnati, has taken over the brass foundry department of the Triumph Electric Company, that city. No additional building or equipment is planned. The Triumph Brass Foundry was the Cincinnati branch of the Dayton Bronze Bearing Company, Dayton, Ohio. This firm operates the following departments: brass, bronze and aluminum foundry.

Chicago Faucet Company, 2712 North Crawford street, Chicago, Ill., has retained Wolf, Sexton, Harper & Trueax, 7 West Madison street, that city, as architects for 2-story, 55 x 65-foot plant of brick, stone and reinforced concrete, to be built at 2700 North Crawford street. E. C. Brown is president of the Chicago Faucet Company. This firm operates the following departments: brass foundry, brass machine shop, tool room, plating, polishing.

James H. Rhodes & Company, Dutch Kills Canal, Long Island City, N. Y., announces the absorption of A. Isaacs & Company, Inc., 58 Beekman street, New York City. In taking over this old and well known business, which was established in 1848, they assume control of the bleachery, packing house at the fisheries, and all merchandise and equipment on hand. In the future, this concern will be a division of James H. Rhodes & Company.

The **Gibb Instrument Company** of Bay City, Mich., has changed its name to **Gibb Welding Machines Company.** This is a change in name only and denotes no change in organization. As the company no longer makes instruments, but is engaged exclusively in the manufacture of electric welding and heating machines, the new name was adopted as more exactly descriptive of the product. The following departments will be operated in the new plant: brass machine shop, tool room.

Ground has been broken by the **Ellison Bronze Company,** Falconer, N. Y., for a one-story foundry adjoining its four-story finishing plant on West Main street, for which considerable equipment will be required. The Ellison Bronze Company is a branch of the Ellison Brass Manufacturing Company. This firm operates the following departments: brass, bronze, and aluminum foundry; brass machine shop, tool room, grinding room, galvanizing, plating, stamping, soldering, polishing, lacquering.

The **John Oster Manufacturing Company,** Racine, Wis., has been incorporated with a capital stock of $50,000 to manufacture tools, dies, die castings, mechanical devices, hardware specialties and similar products, specializing in manufacturing hand clippers and clipper plates. A plant at 16th and Ann streets has been leased and is now being equipped. John Oster is president and general manager. This firm will operate the following departments: tool room, grinding room, plating, stamping, polishing.

The **Wm. J. Sweet Foundry Company,** formerly located at 2527 East York street, Philadelphia, Pa., has moved into its new plant at Irvington, N. J. This concern specializes on Monel and pure nickel castings to withstand corrosion and erosion. In conjunction with the Centricast Tube Company, New York, it also is preparing to produce seamless Monel metal tubing as well as liners, cylinders cast by the centrifugal process. The officers of the company, W. J. Sweet, president, H. A. Cooper, vice-president, and C. C. Bruno, secretary-treasurer, were all at one time connected with the Bayonne Casting Company, Bayonne, N. J., and the International Nickel Company, New York. This firm operates a Monel metal and nickel foundry.

STAINLESS STEEL FOR AIRSHIP

A statement of the intentions of the British Air Ministry in regard to the development of airships was made November 18, 1924, during an official inspection of the Cardington Airship Works and station, England, by Sir Samuel Hoare, Secretary of State for Air.

The visit revealed substantial technical progress in constructional methods for the airship of 5,000,000 cubic feet capacity to be built by the State and showed that stainless steel is to be used instead of duralumin for girder work.

The total lift is to be 155 tons and a disposable load of seventy-five tons, and twenty tons should be available for passengers and goods on the trip of 2,500 miles to Egypt.

The approximate over-all length is 720 feet and the maximum diameter 130 feet. The maximum height is to be 140 feet. Crude oil will be burned in seven engines of 600-horsepower each, instead of gasoline or kerosene. A maximum speed of fifty miles an hour is estimated and 100 passengers will have their accommodations spread over two decks.

It will be some time before comparisons can be made, but it will be interesting to see how stainless steel compares with duralumin in actual practice.

GOVERNMENT OWNERSHIP

Professor Michael Pupin of Columbia University made a plea against Government ownership of public utilities at a luncheon of the Rotary Club at the Hotel McAlpin in October. Expert knowledge required to conduct them efficiently, he said, would be lacking. He pointed to Europe as an example of a

futile attempt to operate large public utilities successfully.

"The weakest point in democracy has always been lack of appreciation of expert knowledge. Railroads, telegraphy, telephony and radio broadcasting, electrical lighting and electrical transmission of power are certainly public utilities, but the intelligent people of the United States will never consent that these things, requiring an enormous amount of expert knowledge, be placed under Government ownership. The machinery of our Government or of any other form of government known to man today is utterly incapable of handling technical problems which require the highest type of training applied to the highest type of intelligence.

"All of these public utilities are full of complex technical problems which cannot and never were intended to be handled by any Government. In Europe we see that where there is governmental ownership the utilities are being run at heavy deficits. And only recently Mussolini has said that he wants to get away from Government ownership and adopt the American system."

CENSUS OF MANUFACTURES, 1923

Smelting and Refining Scrap Metals.—Establishments engaged primarily in the smelting and refining of scrap metals other than gold, silver and platinum reported products valued at $35,785,501, an increase of 136.2 per cent as compared with 1921, the last preceding census year.

Jewelry.—Establishments engaged primarily in the manufacture of jewelry reported a total output valued at $174,033,912, an increase of 36.8 per cent as compared with 1921, the last preceding census year. This classification covers establishments manufacturing jewelry of gold, silver, platinum, gold-filled metal, rolled-gold plate, brass, bronze, copper and other metals.

Secondary Precious Metal Refining. The establishments engaged primarily in the reducing and refining of gold, silver and platinum from sweepings, clippings, polishings and other waste (from dentists, jewelers, etc.), and old gold, silver and platinum reported a total output valued at $69,681,897, an increase of 51.6 per cent as compared with 1921, the last preceding census year. This does not, however, include the smelting and refining of the virgin metals from the ore.

Silversmithing and Silverware. Establishments engaged primarily in the manufacture of silverware reported products valued at $27,161,724, an increase of 11.3 per cent as compared with 1921, the last preceding census year.

In addition, silverware was produced to some extent by establishments engaged primarily in other industries. The value of products thus made outside the industry proper in 1921 was $2,427,166, an amount equal to 9.9 per cent of the total value of the products for the industry as classified. The corresponding value for 1923 has not been ascertained but will be shown in the final reports of the present census.

Radio Apparatus. Radio apparatus to the value of $43,460,676 was manufactured during the year for sale as such. This total includes 1,889,614 head sets, valued at $5,352,441; 508,001 loud speakers, valued at $5,620,961; 414,588 receiving sets of the tube type, valued at $12,065,992; and 116,497 receiving sets of the crystal type, valued at $550,201; together with the other items shown in the table below. The manufacture of 2,601,575 radio tubes, valued at $4,572,251, was reported separately. A part of these tubes were sold to manufacturers to complete receiving sets (and their value is therefore included in the total value of such sets, as given above) and the remainder were sold to individual purchasers for use in the construction of home-made sets.

Gas and Electric Fixtures. Establishments engaged primarily in the manufacture of gas and electric fixtures (not including lamps and reflectors), reported products valued at $60,649,530, an increase of 41.4 per cent as compared with 1921, the last preceding census year.

In addition, gas and electric fixtures were manufactured to some extent as secondary products by establishments engaged primarily in other industries. The value of such commodities thus made outside the industry proper in 1921 was $4,287,657, an amount equal to 10 per cent of the value of products reported for the industry as classified. The corresponding value for 1923 has not yet been ascertained but will be shown in the final reports of the present census.

Lamps and Reflectors.—Establishments engaged primarily in the manufacture of lamps and reflectors reported products valued at $57,229,133, of which amount $22,058,753 was reported by establishments engaged primarily in the manufacture of motor-vehicle lamps; $31,188,447, by establishments whose principal products were other lamps; and $3,981,933, by establishments which manufactured reflectors. The total for 1923 shows an increase of 96.2 per cent as compared with 1921, the last preceding sensus year.

In addition, lamps and reflectors were produced to some extent by establishments engaged primarily in other industries. The value of products thus made outside the industry proper in 1921 was $1,811,505, an amount equal to 6.2 per cent of the total value of products for the industry as classified. The corresponding value for 1923 has not yet been ascertained but will be shown in the final reports of the present census.

Foundry Supplies. Establishments engaged primarily in the manufacture of foundry supplies reported a total output valued at $10,247,864, of which amount $6,196,293 represents foundry facings, core compounds and core oil; $769,421, chaplets; $516,013, molding sand; $338,512, foundry equipment (flasks, sieves, brushes, ladles, etc.); $193,614, flux; and $2,234,011, other products, reported as foundry supplies but no doubt includes products similar to those previously mentioned. The output for 1923 shows an increase of 106.4 per cent as compared with 1921, the preceding census year.

In addition, foundry supplies are manufactured to some extent as secondary products by establishments engaged primarily in other industries. The value of such commodities thus made outside the industry proper in 1921 was $541,145, an amount equal to 10.9 per cent of the total value of products reported for the industry as classified. The corresponding value for 1923 has not yet been ascertained but will be shown in the final reports of the present census.

Stamped and Enameled Ware.—Establishments engaged in stamping and enameling sheet-metal goods reported products valued at $170,923,386, an increase of 69.9 per cent as compared with 1921, the last preceding census year. This industry embraces establishments engaged primarily in the manufacture of stamped or stamped and enameled articles, such as kitchen utensils, bottle caps, automobile tags, perforated screens for milling and mining, bag frames, railway-car seals, etc., made of sheet tin, copper and zinc. It does not, however, include the manufacture of aluminum ware or of plumbing goods, such as bathtubs, lavatories, sinks, etc., nor the enameling, under contract, of goods owned by others.

In addition, stamped and enameled goods were manufactured to some extent by establishments engaged primarily in other industries. The value of such goods thus made outside the industry proper in 1921 was $5,415,608, an amount equal to 5.4 per cent of the total value of products reported for the industry as classified. The corresponding value for 1923 has not yet been ascertained but will be shown in the final reports of the present census.

METAL STOCK MARKET QUOTATIONS

	Par	Bid	Asked
Aluminum Company of America	$100	$500	$525
American Hardware Corporation	100	93	94
Anaconda Copper	50	38¼	38¾
Bristol Brass	25	8	10
International Nickel, com	25	20½	20⅝
International Nickel, pfd	100	92	93
International Silver, com	100	..	145
International Silver, pfd	100	106	108
National Enameling & Stamping	100	23½	23¾
National Lead Company, com	100	155⅛	156
National Lead Company, pfd	100	116	117
New Jersey Zinc	100	181	184
Rome Brass & Copper	100	145	155
Scovil Manufacturing Company	..	230	240
Yale & Towne Mfg. Company, new	..	68	69

Corrected by J. K. Rice, Jr., Co., 36 Wall strett, New York.

Review of the Wrought Metal Business

Written for The Metal Industry by J. J. WHITEHEAD, President Whitehead Metal Products Company of New York, Inc.

Advances in prices of brass and copper, rods, sheets, tubes and wire were made every few days in the early part of November in harmony with the advances which were made in the prices of ingot copper during that period. These advances have been accompanied by an increased volume of business, with the result that a much improved feeling prevailed throughout the entire industry. It is felt that the industry is in a much healthier condition than has prevailed for the past year or year and a half.

The general feeling of optimism in business circles which has developed during the past months has naturally found its way into the various industries which are consumers of metals, and practically all of the mills fabricating these materials report a steadily increasing number of orders.

There is apparently very little, if any, speculating being done on the part of consumers, and the increased volume of purchases that is reported appears to be the result of a genuine demand for the manufactured product. There is comparatively little business being done in futures or for advanced deliveries. It is reported that consumers have almost no stocks on hand, having followed a hand to mouth buying policy for so long a period that practically all of the consuming factors have allowed themselves to run low in stock.

The condition indicated above applies not only to the industries consuming brass and copper, but also to those which nickel alloys of various kinds such as nickel silver, Monel metal, pure nickel and metals in this class. The producers of pure nickel and Monel metal seem to be especially well pleased with the tonnage which has recently been placed, as well as with the general feeling throughout the trade consuming these items. Many industries which have been marking-time awaiting business and political developments, have now let down the bars and are beginning to purchase machinery and make installations in their plants requiring large tonnages of Monel metal and nickel. This is especially noticeable in the textile industry which for many months has remained dormant. There has been a marked improvement through this industry, and manufacturers of textiles have begun to place orders for new machinery and equipment to get their plants into shape for the business which they feel will follow.

The entire metal industry is now imbued with a feeling of confidence as to the future, and a feeling that the next year or two will break all records. It is believed that the educational campaign which has been going on for several years has resulted in stimulating a public demand for a better class of manufactured goods, especially in the construction and furnishing of homes, and that the public has been taught to realize that for plumbing, roofing, house fittings and furnishings wherever metal is required, the cheapest items in the long run are those which are made of copper and nickel or their various alloys. It is well for all of those who are interested in the manufacturing of metal goods to give some thought to a further development of the advertising work that has been going on in this direction.

Metal Market Review

Written for The Metal Industry by METAL MAN

COPPER

Improved demand and higher prices were features of the copper market recently. November sales showed a decided expansion at advancing prices, and the prompt response of buyers to the upward trend of the market showed that confidence in the situation was gaining ground.

Consumers were apparently convinced that the market was in position to move to higher levels of value as the result of increased domestic and foreign demand. Accordingly heavier buying set in after election based largely on the improved sentiment and the likelihood of brighter business prospects for the immediate future. Producers were inclined to make the most they could of the better situation, but notwithstanding more active dealings the price last month did not rise above 14 cents. In the last half of November a slight reaction occurred owing to some selling pressure which caused a decline to 13¾@13⅞ cents for November and December shipment. There was also some business for nearby delivery down to 13½ cents at refinery, but later the market developed renewed firmness and closing prices as we go to press were firm at 14 cents for future shipment.

ZINC

A better demand and gradual advance in price has marked trade conditions in zinc for several weeks past. Domestic galvanizers have bought more freely for future deliveries, and recent developments tend to give buyers more confidence in present market. Foreign buying has also been quite a factor in bringing about a firmer tone and a brighter outlook. Domestic needs are expected to expand, and if smelter stocks continue to decrease there will be a more healthy basis for extended improvement. The New York price for prime Western zinc is 7.20@7.22 cents up to end of December, with East St. Louis basis 6.85@6.87½ cents. Shipments over first quarter of 1925 are quoted 5 points higher.

TIN

The tin market has demonstrated its ability to maintain prices at a spectacular level for many months. The low point of the year for Straits tin was 40 cents in May. During the last six months there have been wide and frequent fluctuations in market quotations, but powerful London trades have succeeded in moving the price ahead with surprising ease by the strongest kind of support.

Consumers have therefore been compelled to cover actual requirements at recent high figures, and recent buying developed on a sufficient scale to give the market a firm undertone. Holders in the Far East have been selling frequently and freely lately, but in spite of the large quantities offered by Singapore the market closed November 26th at 54.25@54.40 cents for Straits. The London pendulum moved back and forward with considerable swing lately, but near the end of November the Straits price was £259 7s. 6d. per ton, against £258 5s. on November 6th. The low London quotation for this year was £205 made in May. Domestic deliveries for first ten months of this year amounted to 54,250 tons, compared with 58,559 tons for corresponding months last year. Deliveries in France and Germany, however, have increased this year. Price of tin may be forced higher by bull manipulators, but conservative consumers will hardly undertake to follow such a movement by heavy buying.

LEAD

Deliveries into consumption are large, but at present quotations the market has developed an easier tone. Caution is being exercised by buyers, and if consumers are in position to maintain this attitude for a considerable period producers may see the light and become more reasonable in their demands. High prices have greatly stimulated output, and on the basis of recent estimates the world production of lead in 1924 is expected to show a gain of 35,000 to 40,000 tons over that in 1923. Consumption in this country has expanded greatly in the last two to three years, but careful observers are inclined to think that American consumption has reached the peak for the present movement. The leading producer continues to quote 8.65 cents as New York price, but the outside market for spot lead is 8.75@8.80 cents East St. Louis and 8.90@9.10 cents New York market quiet.

ALUMINUM

The undertone of the market is so uniformly steady that producers are able to hold prices at 28 cents for 99 per cent

plus virgin metal and 27 cents for 98-99 per cent grade. Consumers are meeting regular requirements to a considerable extent by receipts against former contracts. New demand is not pronounced enough to occasion any market stir, but although the market appears quiet holders are not inclined to make concessions. There is a good demand for remelted aluminum, and owing to comparatively light supply prices are maintained around 26@26½ cents for this grade. France has an under supply of virgin metal from its own sources. The output by French producers is therefore easily absorbed. There is also plenty of outlet for German metal.

ANTIMONY

Chinese holders succeeded in marking up prices sharply in November on the scarcity situation here owing to difficulty of making shipments on account of the war. Regulars was quoted as high as 13 cents c. i. f. New York and 15 cents duty paid. The market is easier lately and dull at 14½@14¾ cents duty paid for spot metal. Consumers bought in a moderate way, but they are not disposed to place orders for important shipments at present. Supplies here are limited.

QUICKSILVER

The market for quicksilver is easier at $69@$69.50 per flask. The London quotation also declined to £10 12s. 6d. on November 25th. Sales were moderate, and the downward tendency made it a buyers' market.

PLATINUM

Refined platinum continues to quote $118 an ounce, but business was on a small scale. Consumers are inclined to hold off for lower prices.

SILVER

Price of silver has declined from the high point of a few weeks ago, but the bullion market is still 69⅛ cents as we make our report. China has been a recent factor both as seller and buyer. Supplies there are comparatively large. This country has been a free seller, and foreign demand is apparently less inclined to become urgent when price advances over 70 cents. India is expected to come in strong as a buyer, and a renewal of buying for country will probably sent in when China withdraws as a seller.

OLD METALS

There was a more active market for scrap metals lately. Heavy copper and wire moved off readily when the refined metal began to harden. Consumers were ready buyers whenever the tone developed a bullish tendency. Heavy lead also was in good demand, and other scrap metals found a fairly good outlet. Dealers quote as follows: Heavy copper, 11@11½ cents; light copper, 9½@9¾ cents; light brass, 5½@5¾ cents; heavy lead, 7½@7¾ cents, and new zinc scrap, 4¼@4¾ cents.

WATERBURY AVERAGE

Lake Copper—Average for 1923, 14.979—January, 1924, 13.00—February, 13.125—March, 13.875—April, 13.625—May, 13.15—June, 12.75—July, 12.75—August, 13.625—September, 13.375—October, 13.25—November, 13.875.

Brass Mill Zinc—Average for 1923, 7.479—January, 1924, 7.25—February, 7.50—March, 7.25—April, 7.00—May, 6.00—June, 6.60—July, 6.70—August, 6.90—September, 7.00—October, 7.15—November, 7.65.

Daily Metal Prices for the Month of November, 1924

Records of Daily, Highest, Lowest and Average

	3	*4	5	6	7	10	11	12	13	14	17	18
Copper (f. o. b. Ref.) c/lb. Duty Free												
Lake (Delivered)	13.75	.....	13.75	13.75	13.75	14.00	14.00	14.00	14.00	14.00	14.125	14.125
Electrolytic	13.625	.....	13.60	13.60	13.60	13.75	13.75	13.75	13.75	13.80	13.90	13.85
Casting	13.125	.....	13.125	13.125	13.125	13.395	13.375	13.375	13.375	13.375	13.50	13.50
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.												
Prime Western	6.575	.....	6.575	6.60	6.65	6.70	6.75	6.80	6.895	6.925	6.925	6.925
Brass Special	6.625	.....	6.625	6.65	6.70	6.75	6.80	6.875	6.925	6.95	6.95	6.95
Tin (f. o. b. N. Y.) c/lb. Duty Free												
Straits	53.50	.....	53.75	53.375	53.625	54.125	54.375	54.25	54.00	54.625	54.625	54.625
Pig 99%	53.00	.....	53.25	52.875	53.00	53.50	53.625	53.50	53.375	53.875	53.875	53.875
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb.	8.85	.....	8.85	8.90	8.95	8.90	8.90	8.90	8.90	8.90	8.875	8.875
Aluminum c/lb. Duty 5c/lb.	28.00	.....	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
Nickel c/lb. Duty 3c/lb.												
Ingot	29.00	.....	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00
Shot	30.00	.....	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Electrolytic	33.00	.....	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	12.25	.....	12.50	12.75	13.50	14.00	14.875	15.00	15.00	15.00	15.00	15.00
Silver c/oz. Troy Duty Free	69.50	.....	69.625	69.50	69.50	69.25	69.50	69.625	69.75	69.25	69.00	69.25
Platinum $/oz. Troy Duty Free	118	.....	118	118	118	118	118	118	118	118	118	118

	19	20	21	24	25	26	*27	28	High	Low	Aver.
Copper (f. o. b. Ref.) c/lb. Duty Free											
Lake (Delivered)	14.00	13.875	13.875	14.00	14.00	14.00	.....	14.125	14.125	13.75	13.951
Electrolytic	13.80	13.70	13.70	13.70	13.85	13.90	.....	13.85	13.95	13.60	13.754
Casting	13.50	13.375	13.375	13.375	13.50	13.50	.....	13.60	13.60	13.125	13.367
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.											
Prime Western	6.90	6.80	6.825	6.85	6.875	6.95	.....	7.05	7.05	6.575	6.808
Brass Special	6.95	6.875	6.90	6.90	6.925	6.975	.....	7.10	7.10	6.625	6.857
Tin (f. o. b. N. Y.) c/lb. Duty Free											
Straits	54.625	54.50	54.50	54.25	54.375	54.50	.....	54.70	54.70	53.375	54.240
Pig 99%	53.875	53.875	53.875	53.625	53.75	53.75	.....	54.125	54.125	52.875	53.590
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb.	8.85	8.85	8.85	8.80	8.80	8.75	.....	8.75	8.95	8.75	8.858
Aluminum c/lb. Duty 5c/lb.	28.00	28.00	28.00	28.00	28.00	28.00	.....	28.00	28.00	28.00	28.00
Nickel c/lb. Duty 3c/lb.											
Ingot	29.00	29.00	29.00	29.00	29.00	29.00	.....	29.00	29.00	29.00	29.00
Shot	30.00	30.00	30.00	30.00	30.00	30.00	.....	30.00	30.00	30.00	30.00
Electrolytic	33.00	33.00	33.00	33.00	33.00	33.00	.....	33.00	33.00	33.00	33.00
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	15.00	14.75	14.75	14.75	14.75	14.75	.....	14.50	15.00	12.25	14.340
Silver c/oz. Troy Duty Free	69.375	68.875	68.625	69.125	69.25	69.125	.....	69.25	69.75	68.625	69.299
Platinum $/oz. Troy Duty Free	118	118	118	118	118	118	.....	117	118	117	117.946

*Holiday.

Metal Prices for December 1, 1924

Copper: Lake, 14.25. Electrolytic, 14.00. Casting, 13.70.
Zinc: Prime Western, 7.075. Brass Special, 7.125.
Tin: Straits, 55.25. Pig, 99%, 54.625.
Lead: 8.75. **Aluminum,** 28.00. **Antimony,** 14.00.
Nickel: Ingot, 29.00. Shot, 30.00. Electrolytic, Internat. Nick. Co., 33.00.
Quicksilver, flask, 75 lbs., $69.50. **Silver,** oz. Troy, $69.25.
Platinum, oz. Troy, $117. **Gold,** oz. Troy, $20.67.

Metal Prices, December 1, 1924

INGOT METALS AND ALLOYS

Brass Ingots, Yellow	9⅝to10½
Brass Ingots, Red	11¼to12¼
Bronze Ingot	12 to13
Bismuth	$1.50to$1.75
Cadmium	60
Casting Aluminum Alloys	21 to24
Cobalt—97% pure	$2.50to$2.75
Manganese Bronze Castings	22 to35
Manganese Bronze Ingots	11½to16
Manganese Bronze Forging	33 to42
Manganese Copper, 30%	28 to45
Parsons Manganese Bronze Ingots	18¼to19¾
Phosphor Bronze	24 to30
Phosphor Copper, guaranteed 15%	17¾to21
Phosphor Copper, guaranteed 10%	17½to20½
Phosphor Tin, guaranteed 5%	65 to70
Phosphor Tin, no guarantee	59 to65
Silicon Copper, 10% ...according to quantity	28 to35

OLD METALS

Buying Prices		Selling Prices
11½to12	Heavy Cut Copper	13 to13¼
11¼to11½	Copper Wire	12 to12¼
9¾to10	Light Copper	10½to11¼
8¾to 9½	Heavy Machine Comp	10½to11
7 to 7¼	Heavy Brass	8¾to 9¼
6 to 6¼	Light Brass	7¼to 7½
7¼to 7½	No. 1 Yellow Brass Turnings	8¼to 8¾
8 to 8½	No. 1 Comp. Turnings	9½to10
6¼to 6½	Heavy Lead	6¾
4	Zinc Scrap	4½
8	Scrap Aluminum Turnings	10
15½to16	Scrap Aluminum, cast alloyed	16½
18	Scrap Aluminum, sheet (new)	20
30	No. 1 Pewter	32
12	Old Nickel anodes	14
18	Old Nickel	20

BRASS MATERIAL—MILL SHIPMENTS

In effect Nov. 13, 1924

To customers who buy 5,000 lbs. or more in one order.

	Net base per lb.		
	High Brass	Low Brass	Bronze
Sheet	$0.18⅛	$0.19⅞	$0.21⅞
Wire	.18⅜	.20⅜	.22⅜
Rod	.16⅛	.20⅝	.22⅜
Brazed tubing	.26⅛	.....	.31⅜
Open seam tubing	.26⅛	.....	.31⅜
Angles and channels	.29⅞	.....	.34⅝

To customers who buy less than 5,000 lbs. in one order.

	Net base per lb.		
	High Brass	Low Brass	Bronze
Sheet	$0.19⅛	$0.20⅞	$0.22⅞
Wire	.19⅝	.21⅜	.23⅜
Rod	.17⅛	.21⅝	.23⅝
Brazed tubing	.27⅛	.....	.32⅝
Open seam tubing	.27⅛	.....	.32⅝
Angles and channels	.30⅛	.....	.35⅝

SEAMLESS TUBING

Brass, 22½c. to 23½c. net base.
Copper, 23¾c. to 24¾c. net base.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod	20⅛c. net base
Muntz or Yellow Metal Sheathing (14" x 48")	18⅛c. net base
Muntz or Yellow Rectangular Sheet other Sheathing	19⅛c. net base
Muntz or Yellow Metal Rod	16⅛c. net base

Above are for 100 lbs. or more in one order.

COPPER SHEET

Mill shipments (hot rolled)	20⅜c. to 22⅞c. net base
From stock	21⅜c. to 23⅜c. net base

BARE COPPER WIRE—CARLOAD LOTS

16⅛c. to 16¼c. net base.

SOLDERING COPPERS

300 lbs. and over in one order	20⅛c. net base
100 lbs. to 200 lbs. in one order	20⅞c. net base

ZINC SHEET

Duty, sheet, 15%.	Cents per lb.
Carload lots, standard sizes and gauges, at mill, less 8 per cent discount	10.75 basis
Casks, jobbers' price	11.25 net base
Open Casks, jobbers' price	12.75 to 13.00 net base

ALUMINUM SHEET AND COIL

Aluminum sheet, 18 ga., base price	40c.
Aluminum coils, 24 ga., base price	36.70c.
Foreign	40c.

NICKEL SILVER (NICKELENE)

Net Base Prices

Grade "A" Nickel Silver Sheet Metal

10% Quality	25½c.
15% "	26¾c.
18% "	27¾c.

Nickel Silver Wire and Rod

10% "	28¾c.
15% "	32 c.
18% "	35 c.

MONEL METAL

Shot	32
Blocks	32
Hot Rolled Rods (base)	40
Cold Drawn Rods (base)	48
Hot Rolled Sheets (base)	42

BLOCK TIN SHEET AND BRITANNIA METAL

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more, 10c. over Pig Tin. 40 to 100 lbs., 15c. over 25 to 50 lbs., 17c. over, less than 35 lbs., 25c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 8c. over N. Y. tin price; 100 lbs. to 500 lbs., 10c. over Pig Tin. 50 to 100 lbs., 15c. over, 25 to 50 lbs., 20c. over, less than 25 lbs., 25c. over. Above prices f. o. b. mill.

SILVER SHEET

Rolled silver anodes .999 fine are quoted at from 71¼c. to 73¼c. per Troy ounce, depending upon quantity.

Rolled sterling silver 68¾c. to 70¼c.

NICKEL ANODES

85 to 87% purity	40½c.-42½c. per lb.
90 to 92% purity	43 c.-45 c. per lb.
95 to 97% purity	45 c.-47 c. per lb.

Supply Prices, December 1, 1924

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	.14–.16½
Acid—		
Boric (Boracic) Crystals	lb.	.12
Hydrochloric (Muriatic) Tech., 20 deg., Carboys	lb.	.02
Hydrochloric, C. P., 20 deg., Carboys	lb.	.06
Hydrofluoric, 30%, bbls	lb.	.08
Nitric, 36 deg. Carboys	lb.	.06
Nitric, 42 deg. Carboys	lb.	.07
Sulphuric, 66 deg. Carboys	lb.	.02
Alcohol—		
Butyl	lb.	.27–.32
Denatured in bbls	gal.	.60–.62
Alum—		
Lump, Barrels	lb.	.04
Powdered, Barrels	lb.	.04½
Aluminum sulphate, commercial tech	lb.	.02⅜
Aluminum chloride solution in carboys	lb.	.06½
Ammonium—		
Sulphate, tech, Barrels	lb.	.03¾
Sulphocyanide	lb.	.65
Argols, white, see Cream of Tartar	lb.	.27
Arsenic, white, Kegs	lb.	.16
Asphaltum	lb.	.35
Benzol, pure	gal.	.60
Blue Vitriol, see Copper Sulphate.		
Borax Crystals (Sodium Biborate), Barrels	lb.	.05½
Calcium Carbonate (Precipitated Chalk)	lb.	.04
Carbon Bisulphide, Drums	lb.	.06
Chrome Green, bbls.	lb.	.36
Cobalt Chloride	lb.	—
Copper—		
Acetate	lb.	.37
Carbonate, Barrels	lb.	.17
Cyanide	lb.	.50
Sulphate, Barrels	lb.	.05¼
Copperas (Iron Sulphate, bbl.)	lb.	.02
Corrosive Sublimate, see Mercury Bichloride.		
Cream of Tartar, Crystals (Potassium bitartrate)	lb.	.27
Crocus	lb.	.15
Dextrin	lb.	.05–.08
Emery Flour	lb.	.06
Flint, powdered	ton	$30.00
Fluor-spar (Calcic fluoride)	ton	$75.00
Fusel Oil	gal.	$4.50
Gold Chloride	oz.	14.00
Gum—		
Sandarac	lb.	.26
Shellac	lb.	.59–.61
Iron, Sulphate, see Copperas, bbl	lb.	.02
Lead Acetate (Sugar of Lead)	lb.	.13
Yellow Oxide (Litharge)	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	1.15
Nickel—		
Carbonate Dry	lb.	.40
Chloride, 100 lb. lots	lb.	.22¼
Salts, single bbls	lb.	.10½
Salts, double, bbl	lb.	.10
Paraffin	lb.	.05–.06
Phosphorus—Duty free, according to quantity		.35–.40
Potash, Caustic Electrolytic 88-92% fused, drums	lb.	
Potassium Bichromate, casks	lb.	.08¾
Carbonate, 80-85%, casks	lb.	.05¼
Cyanide, 165 lb. cases, 94-96%	lb.	.65
Pumice, ground, bbls	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls	lb.	.03
Rouge, nickel, 100 lb. lots	lb.	.25
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in casks	lb.	.08
Silver Chloride, dry	oz.	.86
Cyanide (Fluctuating Price)	oz.	.70
Nitrate, 100 ounce lots	oz.	.49½
Soda Ash, 58%, bbls	lb.	.02½
Sodium—		
Biborate, see Borax (Powdered), bbls	lb.	.05½
Cyanide, 96 to 98%, 100 lbs	lb.	.22
Hyposulphite, kegs	lb.	.04
Nitrate, tech. bbls	lb.	.04¼
Phosphate, tech., bbls	lb.	.03½
Silicate (Water Glass) bbls	lb.	.02
Sulpho Cyanide	lb.	.45
Soot, Calcined	lb.	—
Sugar of Lead, see Lead Acetate	lb.	.13
Sulphur (Brimstone) bbls	lb.	.02
Tin Chloride, 100 lb. kegs	lb.	.39
Tripoli, Powdered	lb.	.03
Verdigris, see Copper Acetate	lb.	.37
Water Glass, see Sodium Silicate, bbls	lb.	.02
Wax—		
Bees, white ref. bleached	lb.	.55
Yellow, No. 1	lb.	.35
Whiting, Bolted	lb.	.02½–.06
Zinc, Carbonate, bbls	lb.	.13–.17
Chloride, 600 lb. lots	lb.	.07
Cyanide	lb.	.41
Sulphate, bbls.	lb.	.03⅜

COTTON BUFFS

Open buffs, per 100 sections (nominal).

12 inch, 20 ply, 64/68, cloth	base, 40.85
14 inch, 20 ply, 64/68, cloth	base, 50.80
12 inch, 20 ply, 84/92, cloth	base, 46.20
14 inch, 20 ply, 84/92, cloth	base, 62.25
12 inch, 20 ply, 88/96, cloth	base, 63.25
14 inch, 20 ply, 88/96, cloth	base, 85.15
Sewed Buffs, per lb., bleached and unbleached	base, .65 to .75

FELT WHEELS

		Price Per Lb. Less Than 100 Lbs.	300 Lbs. and Over
Diameter—10" to 16"	1" to 3"	2.85	2.60
" 6" 8" and over 16"	1" to 3"	2.95	2.70
" 6" to 24"	Over 3"	3.25	2.90
" 6" to 24"	½" to 1"	3.85	3.60
" 4" to 6"	¼" to 3"	4.85	Any quantity
" Under 4"	¼" to 3"	5.45	Any quantity

Grey Mexican or French Grey—10c. less per lb. than Spanish, above.

THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED

THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER

ELECTRO-PLATERS REVIEW

VOLUME 22

JANUARY—DECEMBER, 1924

THE METAL INDUSTRY PUBLISHING COMPANY

New York

ARTICLES MARKED (*) ARE ILLUSTRATED

ARTICLES

A

Abrasives in Bronze Bushings 19
Acid Copper Solution, Test for 361
*Adjustable Reamer or Boring Tool 280
Airplane, High Speed 445
*Alkaline Cleaning Solutions, Metal Cleansing with 184
*Alloy Castings from Sheet Scrap, Aluminum 481
Alloys, A List of 238, 270, 313, 355
Alloys, Analysis of Aluminum and Its 280
Alloys, Inhomogeneities in 9
Alloys, Permanent-Mold Casting of Aluminum 6
*Aluminum Alloy Castings from Sheet Scrap 481
Aluminum Alloys, Permanent-Mold Casting of 6
*Aluminum and Copper Fabricated by Welding 108
Aluminum and Its Alloys, Analysis 280
Aluminum and Some of Its Physical Characteristics 349
Aluminum, Blanking Punches and Dies for. 99
Aluminum in 1923 21
Aluminum Industry in America, The 450
*Aluminum, Nickel Plating 282
*Aluminum Tea Kettles 187
Aluminum, The Determination of Carbon in 318
America, The Aluminum Industry in 450
American Electrochemical Society 181
American Electro-Platers' Society, A Short History of the 227
*American Electro-Platers' Society Convention 223, 265
Analysis of Aluminum and Its Alloys 280
Annealing, Bright 280
*Annual Meeting of the Institute of Metals Division 95
*Annual Metal Finishers' Exposition, Second 114
Anodes, Tests on Nickel 312
Answer to Most Rolling Mill Riddles, The. 9
*Antimony and Lead, The Production of 139
*Art Bronze Work 483
Aspects of the Platinum Stamping Law, Some 362
Auto Bumpers, Finishing 359

B

Bag Frames, Green Gold on 14
Barrels by Nickel Plating, Reclaiming Gun 447
Base Metals to Glass, Sealing 279
Base Price for Metal 109
Bearings for Electric Motors 447
Bending Brass and Copper Pipe 236
Black Nickel Plating 449
Blackened Nickel-Plated Faucets 281
Blanking Punches and Dies for Aluminum .. 99
*Bodies, Crating Valve 484
Bok Peace Plan, The 22
*Boring Tool, Adjustable Reamer or 280
Bottoms, Recovering Furnace 351
Brass and Copper, Cleaning 279
Brass and Copper Pipe, Bending 236
Brass and White Metal, Nickel in 234
*Brass, Bronze and Copper Products 491
Brass Cartridges, Manufacturing 63
*Brass Company, Plating Research of the Bridgeport 485
*Brass Company, The Michigan Copper and. 475
Brass, Cleaning 67
Brass Faucets, Grinding 145
Brass Foundries, Impressions of British 60
*Brass Foundry Sands, Reclaiming 438
*Brass Globe Valves, Seating 6
Brass Melting Crucibles, Graphites for 59
Brass Moulder, What is a 395
Brass or Copper, Lubricant for Drawing 484
*Brass, Ordering the Right Kind of Sheet. 69
Brass Rod, Imperfect Leaded 236
Brass, Rolling Light Gauge Sheet 109
Brass Solution, The 319
Brass, Standardization of Plumbing 22
Brazing, Dip 190
*Bridgeport Brass Company, Plating Research of the 485
Bright Annealing 280
*Britannia Vases, Casting 401
British Brass Foundries, Impressions of 60
British Empire Exhibition, The Non-Ferrous Exhibits of the 240
British Impressions 322
British Institute of Metals 399, 480
British Institute of Metals Meeting 143
British Metal Polishing Industry, Industrial Fatigue Conditions in the 487
*Bronze, and Copper Products, Brass 491
Bronze Bushings, Abrasives in 19
*Bronze Figure, Unusual 14
Bronze, Rolling Manganese 354
*Bronze Work, Art 483
Bumpers, Finishing Auto 359
Bushings, Abrasives in Bronze 19
Business, Taxation: The People's 230

C

Carbon in Aluminum, The Determination of 318
Cartridges, Manufacturing Brass 63
*Casting Britannia Vases 401
Casting in the Ford Plant, Die 363
Casting of Aluminum Alloys, Permanent-Mold 6
*Casting Metals 7, 64, 103, 142, 194, 236, 276, 317, 354
*Castings from Sheet Scrap, Aluminum Alloy 481
*Casting Method, The Mounting of Diamonds by the 311
*Casting Valve Bodies 484
Castings, Cupola 444
Cast Iron, Soldering 67
Characteristics, Aluminum and Some of Its Physical 349
Chemists, President Coolidge Praises 198
Chromium Plating Steel 65
*City, Milwaukee the Convention 389
*Cleaners, Prepared Metal 488
Cleaning Brass 67
Cleaning Brass and Copper 279
*Cleaning Metals, Modern Methods of 402
*Cleaning Solutions, Metal Cleansing with Alkaline 184
*Cleansing with Alkaline Cleaning Solutions, Metal 184
Cock Keys, Grease for Gas 6
Company Omitted, J. B. Ford 364
*Company, The Michigan Copper and Brass. 475
Conference on Electroplating 480
Control of Gold and Silver Deposited by Weight 268
*Convention, American Electro-Platers' Society 223, 265
*Convention City, Milwaukee the 389
Convention in Milwaukee, The Foundrymen's 364
*Convention, The Foundry 433
Coolidge Praises Chemists, President 198
*Copper and Brass Company, The Michigan. 475
Copper, Cleaning Brass and 279
*Copper Fabricated by Welding, Aluminum and 108
Copper, Lubricant for Drawing Brass or 484
Copper Myth, The Hardened 352
Copper Pipe, Bending Brass and 236
*Copper Products, Brass, Bronze and 491
Copper Sheet, Stained 406
Copper Solution, Test for Acid 361
*Copper Wire, The Manufacture of 309
Correction to Platers' Wrinkles 195
Corrosion of Metals 197
Crucibles, Graphites for Brass Melting 59
Crucibles, Storing 98
Cupola Castings 444
Current Transformer, Direct 235
Cutting Tools 54

D

Demand for Silver 198
Deposited by Weight, Control of Gold and Silver 268
Deposits, Diseases of Nickel 66, 153
*Detarnishing of Silver, The Tarnishing and 15, 110, 151, 231
Determination of Carbon in Aluminum, The 318
Determination of Molten Metals, The Temperature 189
*Diamonds by the Casting Method, The Mounting of 311
Die Casting in the Ford Plant 363
Dies for Aluminum, Blanking Punches and. 99
Dip Brazing 190
Direct Current Transformer 235
Direct in the Foundry, Melting Scrap 275
Diseases of Nickel Deposits 66, 153
*Division, Annual Meeting of the Institute of Metals 95
Drawing Brass or Copper, Lubricant for 484
Drawing Rectangular Shapes 443

E

Effect of Temperature Upon Metals 446
Electric Motors, Bearings for 447
Electrochemical Society, American 181
Electroforming, Recent Progress in Electroplating and 229
Electrolytic Nickel, Mechanically Perfect ... 320
Electro-Platers' Society, A Short History of the American 227
*Electro-Platers' Society Convention, American 223, 265
Electroplating and Electroforming, Recent Progress in 229
Electroplating, Conference on 480
Electro-Plating Industry in 1923, The 20
Electro-Plating Research 154
Empire Exhibition, The Non-Ferrous Exhibits of the British 240
Enameled Iron Ware Warps, Why 276
Equipment, Plating Room 19
Etching 113
Exhibition, The Non-Ferrous Exhibits of the British Empire 240
Exhibits of the British Empire Exhibition, The Non-Ferrous 240
*Exposition, Second Annual Metal Finishers' 114

F

*Fabricated by Welding, Aluminum and Copper 108
Fatigue Conditions in the British Metal Polishing Industry, Industrial 487
Faucets, Blackened Nickel-Plated 281
Faucets, Grinding Brass 145
*Figure, Unusual Bronze 14
*Finishers' Exposition, Second Annual Metal 114
Finishing Auto Bumpers 359
Ford Company Omitted, J. B. 364
Ford Plant, Die Casting in the..... 363
Foundries, Impressions of British Brass..... 60
*Foundry Convention, The 433
Foundry, Melting Scrap Direct in the..... 275
Foundry Problems, Some 104
*Foundry Sands, Reclaiming Brass..... 438
Foundry, The Molding Machine in the Jobbing 357
Foundrymen's Convention in Milwaukee, The 364
Frames, Green Gold on Bag..... 14
Friction Wedge, Metal for 310
Furnace Bottoms, Recovering 351

G

Gas Cock Keys, Grease for 6
Gaskets, Punching Lead Washers or..... 394
Gauge Sheet Brass, Rolling Light 109
Glass, Sealing Base Metals to 279
*Globe Valves, Seating Brass 6
Gold and Silver Deposited by Weight, Control of 208
Gold on Bag Frames, Green 14
Gold Scraps, Recovering 109
Golf Heads, Monel Metal 99
Government and Industry 198
Graphites for Brass Melting Crucibles 59
Grease for Gas Cock Keys 6
Green Gold on Bag Frames 14
Grinding Brass Faucets 145
Gun Barrels by Nickel Plating, Reclaiming. 447

H

Hardened Copper Myth, The 352
Heads, Monel Metal Golf 99
High Speed Airplane 445
History of the American Electro-Platers' Society, A Short 227
Hot Nickel Solution 150
*House, Metal on Washington's 312

I

Imperfect Leaded Brass Rod 236
Impressions, British 322
Impressions of British Brass Foundries..... 60
Industrial Fatigue Conditions in the British Metal Polishing Industry 487
Industry, Government and 198
Industry in America, The Aluminum 450
Industry in 1923, The Electro-Plating..... 20
*Industry, The Metal Trades and the Radio. 53
Inhomogeneities in Alloys 9
Institute of Metals, British 399, 480
*Institute of Metals Division, Annual Meeting of the 95
Institute of Metals Meeting, British 143
Investigations, Plating 360
Iron, Soldering Cast 67
Iron Ware Warps, Why Enameled 276
Ironless Yacht, New 437

J

Jewelry Production, Speeding 358
Jobbing Foundry, The Molding Machine in the 357

K

*Kettles, Aluminum Tea 187
Keys, Grease for Gas Cock 6
*Kind of Sheet Brass, Ordering the Right.. 69

L

Law, Some Aspects of the Platinum Stamping 362
*Lead, The Production of Antimony and.... 139
Lead Washers or Gaskets, Punching 394
Leaded Brass Rod, Imperfect 236
Light Gauge Sheet Brass, Rolling..... 109
List of Alloys, A.....238, 270, 313, 355
Loose Pulley Troubles 99
Lubricant for Drawing Brass or Copper.... 484

M

Machine in the Jobbing Foundry, The Molding 357
Machine Practice, Molding 5
*Machine Practice, Molding 237, 272
*Machine, The Molding 56
*Machine, The Squeezer Molding 191
*Machines and Molding Practice, Molding... 100
*Machines, Types of Molding 315, 397, 442
Machines, Why Molding 146
Manganese Bronze, Rolling 354
*Manufacture of Copper Wire, The..... 309
Manufacture of Phonograph Matrixes, The.. 405
Manufacturing Brass Cartridges 63
Market for 1923, Review of the Silver..... 68
Market, Silver 21
Materials Society Meeting, Testing 269
Matrixes, The Manufacture of Phonograph. 405
Mechanically Perfect Electroiytic Nickel.... 320
Meeting, British Institute of Metals..... 143
*Meeting of the Institute of Metals Division, Annual 95
Meeting of the Newark Platers..... 195
Meeting of the New York Platers..... 112
Meeting, Metal Trades 198
Meeting, Testing Materials Society 269
Melting Crucibles, Graphites for Brass..... 59
Melting Scrap Direct in the Foundry..... 275
Metal, Base Price for 109
*Metal Cleaners, Prepared 488
*Metal Cleansing with Alkaline Cleaning Solutions 184
*Metal Finishers' Exposition, Second Annual 114
Metal for Friction Wedge 310
Metal Golf Heads, Monel 99
Metal, Nickel in Brass and White..... 234
Metal Polishing Industry, Industrial Fatigue in the 487
*Metal on Washington's House 312
*Metal Trades and the Radio Industry, The 53
Metal Trades Meeting 198
Metals, British Institute of 399, 480
*Metals, Casting.....7, 64, 103, 142, 194, 236, 276, 317, 354
Metals, Corrosion of 197
*Metals Division, Annual Meeting of the Institute of 95
Metals, Effect of Temperature Upon 446
Metals Meeting, British Institute of 143
*Metals, Modern Methods of Cleaning..... 402
*Metals, New Uses for 1, 55
Metals, Testing 312
Metals, The Temperature Determination of Molten 189
Metals to Glass, Sealing Base 279
*Method, the Mounting of Diamonds by the Casting 311
*Methods of Cleaning Metals, Modern 402
*Michigan Copper and Brass Company, The. 475
Mill Riddles, The Answer to Most Rolling.. 9
*Milwaukee the Convention City 389
Milwaukee, The Foundrymen's Convention in 264
*Modern Methods of Cleaning Metals 402
Molding Machine in the Jobbing Foundry, The 357
Molding Machine Practice 5
*Molding Machine Practice 237, 272
*Molding Machine, The 56
*Molding Machine, The Squeezer 191
*Molding Machines and Molding Practice... 100
*Molding Machines, Types of.....315, 397, 442
Molding Machines, Why? 146
*Molding Practice, Molding Machines and... 100
Molten Metals, The Temperature Determination of 189
Monel Metal Golf Heads 99
Motors, Bearings for Electric 447
Moulder, What is a Brass 395
*Mounting of Diamonds by the Casting Method, The 311
Myth, The Hardened Copper 352

N

Newark Platers, Meeting of the..... 195
*New Uses for Metals 1, 55
New Uses for Silver 197
New York Platers, Meeting of the..... 112
Nickel Anodes, Tests on 312
Nickel Deposits, Diseases of 66, 153
Nickel in Brass and White Metal 234
Nickel, Mechanically Perfect Electroiytic.... 320
Nickel-Plated Faucets, Blackened 281
*Nickel Plating Aluminum 282
Nickel Plating, Black 449
Nickel Plating, Reclaiming Gun Barrels by. 447
Nickel Silver, Solder for 9
Nickel Solution, Hot 150
Nickel Solutions, Survey of (conclusion).... 18
Niobis Rings 359
Non-Ferrous Exhibits of the British Empire Exhibition, The 240

O

Omitted, J. B. Ford Company 364
*Ordering the Right Kind of Sheet Brass... 69

P

Past and Present, Platers 196
Peace Plan, The Bok 22
People's Business, Taxation: The 230
Perfect Electroiytic Nickel, Mechanically... 320
Permalloy 394
Permanent-Mold Casting of Aluminum Alloys 6
Phonograph Matrixes, The Manufacture of.. 405
Physical Characteristics, Aluminum and Some of Its 349
Pictures by Telegraph 240
Pipe, Bending Brass and Copper 236
Pittman Act, Silver and the 114
Plan, The Bok Peace 22
Plant, Die Casting in the Ford..... 363
Plated Faucets, Blanckened Nickel..... 281
Platers, Meeting of the Newark..... 195
Platers, Meeting of the New York..... 112
Platers, Past and Present..... 196
Platers' Society, A Short History of the American Electro- 227
*Platers' Society Convention, American Electro- 223, 265
Platers' Wrinkles, Correction to..... 195
*Plating Aluminum, Nickel 282
Plating and Electroforming, Recent Progress in Electro- 229
Plating, Black Nickel 449
Plating Industry in 1923, The Electro-..... 20
Plating Investigations 360
Plating, Reclaiming Gun Barrels by Nickel. 447
Plating Research, Electro- 154
*Plating Research of the Bridgeport Brass Company 485
Plating Room Equipment 19
Plating Steel, Chromium 65
*Plating Work, Railroad 448
Platinum Stamping Law, Some Aspects of the 362
Plumbing Brass, Standardization of 22
Polishing Industry, Industrial Fatigue Conditions in the Metal 487
Power Show 55
Practice, Molding Machine 5
*Practice, Molding Machine..... 237, 272
*Practice, Molding Machines and Molding.. 100
Praises Chemists, President Coolidge..... 198
*Prepared Metal Cleaners 488
Present, Platers, Past and 196
President Coolidge Praises Chemists 198
Price for Metal, Base 109
Problems, Some Foundry 104
*Products, Brass, Bronze and Copper..... 491
*Production of Antimony and Lead, The..... 139
Production, Speeding Jewelry 358
Progress in Electroplating and Electroforming, Recent 229
Pulley Troubles, Loose 99
Punches and Dies for Aluminum, Blanking... 99
Punching Lead Washers or Gaskets..... 394

R

*Radio Industry, The Metal Trades and the. 53
*Railroad Plating Work 448
*Reamer or Boring Tool, Adjustable..... 280
Recent Progress in Electro-Plating and Electro-Forming 229
*Reclaiming Brass Foundry Sands..... 438
Reclaiming Gun Barrels by Nickel Plating.. 447
Recovering Furnace Bottoms 351
Recovering Gold Scraps 109
Rectangular Shapes, Drawing 443
*Research of the Bridgeport Brass Company, Plating 485
Research, Electro-Plating 154
Review of the Silver Market for 1923..... 68
Riddles, The Answer to Most Rolling Mill... 9
*Right Kind of Sheet Brass, Ordering the. 69
Rings, Niobis 359
Rod, Imperfect Leaded Brass..... 236
Rolling Light Gauge Sheet Brass..... 109
Rolling Manganese Bronze 354
Rolling Mill Riddles, The Answer to Most.. 9
Roofs Under Test, Zinc 351

S

Salesmanship 155
*Sands, Reclaiming Brass Foundry 438
*Scrap, Aluminum Alloy Castings from Sheet 481
Scrap Direct in the Foundry, Melting 275
Scraps, Recovering Gold 109
Screwdriver Sizes, Simplify 198
Sealing Base Metals to Glass 279
*Seating Brass Globe Valves 6
*Second Annual Meet Finishers' Exposition.. 114
Shapes, Drawing Rectangular 443
*Sheet Brass, Ordering the Right Kind of.. 69
Sheet Brass, Rolling Light Gauge 109
*Sheet Scrap, Aluminum Alloy Castings from 481
Sheet, Stained Copper 406
Short History of the American Electro-Platers' Society, A 227
Show, Power 55
Silver and the Pittman Act 114
Silver, Demand for 198
Silver Deposited by Weight, Control of Gold and 208
Silver Market 21
Silver Market for 1923, Review of the..... 68
Silver, New Uses for 197
Silver, Solder for Nickel 9
*Silver-Soldering, Welding Versus..... 353
*Silver, The Tarnishing and Detarnishing of 15, 110, 151, 231
Simplify Screwdriver Sizes 198
Sizes, Simplify Screwdriver 198
Society, American Electrochemical 181
Society, A Short History of the American Electro-Platers' 227
*Society Convention, American Electro-Platers' 223, 265
Society Meeting, Testing Materials 269
Solder for Nickel Silver 9
Soldering Cast Iron 67
*Soldering, Welding Versus Silver 353
Solution, Hot Nickel 150
Solution, Test for Acid Copper 361
Solution, The Brass 319
*Solutions, Metal Cleansing with Alkaline Cleaning 184
Solutions, Survey of Nickel, Conclusion..... 18
Some Aspects of the Platinum Stamping Law 362
Some Foundry Problems 104
Speed Airplane, High 445
Speeding Jewelry Production 358
*Spoon, The Story of the 148, 277
*Squeezer Molding Machine, The 191
Stained Copper Sheet 406
Stamping Law, Some Aspects of the Platinum 362
Standardization of Plumbing Brass..... 22
Steel, Chromium Plating 65
Storing Crucibles 98
*Story of the Spoon, The 148, 277
Survey of Nickel Solutions, Conclusion..... 18

T

*Tarnishing and Detarnishing of Silver, The. 15, 110, 151, 231
Taxation: The People's Business 230
*Tea Kettles, Aluminum 187
Telegraph, Pictures by 240
Temperature Determination of Molten Metals, The 189
Temperature Upon Metals, Effect of 446
Test for Acid Copper Solution 361
Test, Zinc Roofs Under 351
Testing Materials Society Meeting..... 269
Testing Metals 312
Tests on Nickel Anodes 312
*Tool, Adjustable Reamer or Boring..... 280
Tools, Cutting 54
*Trades and the Radio Industry, The Metal 53
Trades Meeting, Metal 198
Transformer, Direct Current 235
*Tripoli 10
Troubles, Loose Pulley 99
*Types of Molding Machines 315, 397, 442

U

Under Test, Zinc Roofs 351
*Unusual Bronze Figure 14
*Uses for Metals, New 1, 55
Uses for Silver, New 197

V

*Valve Bodies, Casting 484
*Valves, Seating Brass Globe 6
*Vases, Casting Britannia 401

W

Ware Warps, Why Enameled Iron 276
Warps, Why Enameled Iron Ware 276
Washers or Gaskets, Punching Lead 394
*Washington's House, Metal on 312
Wedge, Metal for Friction 310
Weight, Control of Gold and Silver Deposited by 268
*Welding, Aluminum and Copper Fabricated by 108
*Welding Versus Silver-Soldering 353
What is a Brass Moulder? 395
White Metel, Nickel in Brass and..... 234
Why Enameled Iron Ware Warps 276
Why Molding Machines?..... 146
*Wire, The Manufacture of Copper..... 309
*Work, Art Bronze 483
*Work, Railroad Plating 448
Wrinkles, Correction to Platers'..... 195

Y

Yacht, New Ironless 437

Z

Zinc Roofs Under Test 351

AUTHORS

A

Abate, W. L. Grease for Gas Cock Keys.. 6
Aluminum Man. Aluminum in 1923..... 21
Aluminum Man. *New Uses for Metals... 3
Anderson, Robert, J. Determination of Carbon in Aluminum, The..... 318
Arnold, J. F. *Art Bronze Work..... 483

B

Baily, T. F. *New Electric Furnace..... 32
Baker, E. M. *Metal Cleansing with Alkaline Cleaning Solutions..... 184
Bartley, Jonathan. Graphites for Brass Melting Crucibles 59
Bartley, Jonathan. Storing Crucibles..... 98
Binney, R. L. Temperature Determination of Molten Metals, The 189
Blair, P. W. *Adjustable Reamer or Boring Tool 280
Blair, P. W. Bending Brass and Copper Pipe 236
Blair, P. W. Blanking Punches and Dies for Aluminum 99
Blair, P. W. Dip Brazing..... 190
Blair, P. W. Drawing Rectangular Shapes 443
Blair, P. W. Grease for Gas Cock Keys.. 6
Blair, P. W. Loose Pulley Troubles..... 99
Blair, P. W. Lubricant for Drawing Brass or Copper 484
Blair, P. W. Monel Metal Golf Heads.... 99
Blair, P. W. Punching Lead Washers or Gaskets 394
Blair, P. W. Solder for Nickel Silver..... 9
Blair, P. W. Soldering Cast Iron..... 67
Blair, T. S. *Prepared Metal Cleaners.... 488
Blum, Dr. William. Electro-Plating Research 154
Blum, Dr. W. Recent Progress in Electro-Plating and Electroforming..... 229
Bregman, Adolph. New Uses for Metals.. 55
Brooks, Samuel H. Determination of Carbon in Aluminum, The..... 318
Butler, P. B. *Tripoli 10

C

Campbell, Wm. A List of Alloys 238, 270, 313, 355
Christie, John L. *Ordering the Right Kind of Sheet Brass 69
Christie, John L. *Plating Research of the Bridgeport Brass Company 485
Clark, Royal F. Plating Room Equipment. 19
Clarke, R. R. Molding Machine in the Jobbing Foundry, The 357
Clarke, R. R. Molding Machine Practice 237, 272
Clarke, R. R. *Molding Machines and Molding Practice 100
Clearner, A. *Modern Methods of Cleaning Metals 402
Corse, W. M. Nickel in Brass and White Metal 234

D

Deterding, Henry C. Melting Scrap Direct in the Foundry 275
Dickie, Francis. *Railroad Plating Work. 448

E

Eichstaedt, T. C. Finishing Auto Bumpers 350
Eldridge, C. H. Conference on Electroplating 489
Emmett, W. L. R. *Power from Mercury Vapor 33
Erickson, E. G. *Skeppstedt Multiple Core-Making Machine, The..... 291

F

Flanagan, Nelson F. Molding Machine Practice 5
Foley, R. L. *Milwaukee the Convention City 389

G

Gebling, George. Platers, Past and Present 190
Gleason, Edward D. Hardened Copper Myth, The 352
Grubb, A. A. *Reclaiming Brass Foundry Sands 438

H

Haas, Joseph, Jr. Survey of Nickel Solutions 18
Hall, Joseph A. Control of Gold and Silver Deposited by Weight 268
Hancock, Clarence L. History of Phono-Electric Wire 416
Harper, Thomas. British Impressions..... 322
Harper, Thomas. Impressions of British Brass Foundries 60
Hibben, F. M. *High Speed Heavy Duty Polishing 207
Hiers, Geo. O. *New Uses for Metals..... 3
Hirschmann, W. F. Cutting Tools..... 54
Hirschmann, W. F. Grinding Brass Faucets 145
Hirschmann, W. F. Manufacturing Brass Cartridges 63
Hirschmann, W. F. *Seating Brass Globe Valves 6
Hoke, Calm Morrison. Some Aspects of the Platinum Stamping Law..... 362
Huntley, F. J. Die Casting in the Ford Plant 363

J

Jarvis, Ernest G. Effect of Temperature Upon Metals 446
Jennings, T. F. Cupola Castings..... 444
Jones, Jessie L. Bearings for Electric Motors 447
Jones, Jesse L. Metal for Friction Wedge 310

K

King, Willis R. Test for Acid Copper Solution 361
Knerr, Horace. *Aluminum Alloy Castings from Sheet Scrap 481
Krom, L. J. Base Price for Metal..... 109

L

Levings, G. V. B. *Tripoli..... 10
Lott, Merrill R. What is a Brass Moulder? 395

M

Madsen, Charles P. Mechanically Perfect Electrolytic Nickel 320
Maxwell, Harry Buddington. Black Nickel Plating 449
Miller, C. W. Why Molding Machines?... 146
Miller, Howard. *Mounting of Diamonds
Millman, A. *Michigan Copper and Brass Company, The 475
by the Casting Method, The..... 311
Mitchell, R. C. *New Motor Driven Polishing Lathe 334
Mundey, A. H. Some Foundry Problems... 104

P

Parry, Wm. H. Salesmanship..... 155
Pettis, Wm. J. Answer to Most Rolling Mill Riddles, The 9
Pettis, W. J. Bright Annealing 280
Pettis, W. J. Imperfect Leaded Brass Rod 236
Pettis, W. J. Recovering Furnace Bottoms 351
Pettis, W. J. Rolling Light Gauge Sheet Brass 109
Pettis, W. J. Rolling Manganese Bronze. 354
Pettis, W. J. Stained Copper Sheet..... 406
Pettis, W. J. *The Manufacture of Copper Wire 309
Proctor, Chas. H. Cleaning Brass and Copper 279
Proctor, C. H. Etching 113
Proctor, C. H. Green Gold on Bag Frames 14
Proteor, Chas. H. *Nickel Plating Aluminum 282
Proctor, Chas. H. Niobils Rings..... 359
Proteor, C. H. Recovering Gold Scraps... 109
Proctor, C. H. The Electro-Plating Industry in 1923 39

R

Ramsay, H. L. *Electric Solder Pot..... 80
Reardon, W. J. *Casting Britannia Vases 401
Reardon, Wm. J. *Casting Metals 7, 64, 103, 142, 194, 236, 276, 317, 354
Reardon, W. J. *Casting Valve Bodies.... 484
Richardson, Commander H. C. High Speed Airplane 445

S

Saunders, A. F. *The Story of the Spoon 148, 277
Schneidewind, Richard. *Metal Cleansing with Alkaline Cleaning Solutions..... 184
Schramm, G. N. *The Tarnishing and Detarnishing of Silver.....15, 110, 151, 231
Schwartz, K. W. Chromium Plating Steel 65
Search, R. E. *Squeezer Molding Machine, The 191
Search, R. E. *The Molding Machine..... 50
Search, R. E. *Types of Molding Machines 315, 397, 442
Servis, Oscar E. A Short History of the American Electro-Platers' Society..... 227
Sizelove, O. J. Brass Solution, The..... 319
Stevens, Frederic B. Blackened Nickel-Plated Faucets 281
Stirlen, Eugene D. *The Double-Wedge Comparator 164
Suhl, R. L. *New Uses for Metals..... 4

T

Terbille, N. I. Temperature Determination of Molten Metals, The..... 189
Turner, E. A. *New Uses for Metals..... 4
Tuthill, S. S. *New Uses for Metals..... 2

U

Universal Trade Press Syndicate. Industrial Fatigue Conditions in the British Metal Polishing Industry 487

V

Vinal, G. W. *The Tarnishing and Detarnishing of Silver.....15, 110, 151, 231
Voss, Wm. Diseases of Nickel Deposits 66, 153

W

Wegner, L. *American Electro-Platers' Society Convention 283
Wegner, L. *American Electro-Platers' Society Convention 365
Wein, Samuel. Manufacture of Phonograph Matrixes, The 406
Willcox, Dudley. *Melting Metal at 2900° (5252° F) 290
Willis, Wm. A. *New Uses for Metals..... 1
Wolf, F. L. *Reclaiming Brass Foundry Sands 438
Woodmansee, E. W. Cleaning Brass..... 67

Y

Yates, Raymon Francis. *The Metal Trades and the Radio Industry..... 53

EDITORIALS

A

Accelerated Corrosion Test..... 234
Aluminum in Politics 452
Aluminum Statistics 285
American Copper Consumption 408
American Electro-Platers' Society..... 284
American Foundrymen's Association 409

B

Business Conditions 158
Business Situation, The 495

C

Commerce Department and Metals..... 494
Co-operative Purchasing 201
Copper Consumption 72
Corrision Resistant Alloys 326

E

Electric Brass Furnaces 243
Electro-Platers' Convention, The 242
Electro-Plating Process 200
Eliminating Useless Lines 158
Ex-President Wilson 73
Eye Sight Conservation 327

F

Foundry Apprentices 494
Foundrymen's Convention, The 452

G

"Gold Filled" 453
Guaranteed Metal Products 200

H

Hot Zinc Coating 117

I

Industrial Standardization 408
Institute of Die Casting 285
Institute of Electro-Plating 116
Institute of Metals Division 116

M

Metal Consumption 242
Metal Dust Explosions 72

Metal Finishers' Exposition, The..... 201
Metal Industry in New York..... 327
Metal Industry of Age, The 25
Metal Research 306
Metal Reserves 158
Muscle Shoals and the Light Metals..... 200

N

Nickel Itch 284

P

Platers' Research Conference 453
Practical College Training 495
Preventing Accidents 366
Prize Awards for Platers 159
Profits and Losses 409

R

Recognizing Ability 367
Research in Copper and Brass..... 116
Retrospective Review of 1923—Outlook for 1924 24
Roosevelt Medals of Honor 409

S

Secondary Smelting Merger..... 243
Ships Without Sails or Engines..... 495
Shop Problems and Answers..... 242
Silver Producers' Association..... 409
Special Car to Platers' Convention..... 201
Standard Precious Metal Alloys..... 337

T

Theory and Practice..... 243
Trade Associations 72
Trend in the Science of Metals, The..... 326

V

Value of Silver 117

Z

Zinc for Building 201

NEW BOOKS

A

Appraisers' and Adjusters' Handbook..... 411

B

Book of Standards 495
Book of Tentative Standards 496

C

Combustion 496
Copper Flashings 203
Corrosion Tests and Materials of Construction for Chemical Engineering Apparatus 203
Cost Accounting in the Metal Stamping Plant 286
Crain's Market Data Book and Directory of Glass, Trade and Technical Publications 286

D

Die Legierungen (Alloys)..... 496
Die Metallfarbung (Coloring Metals)..... 495

E

Electro Deposition of Metals 328
Electro-Metallurgy 160
First (Experimental) Report to the Atmospheric Corrosion Research Committee (of the British Non-Ferrous Metals Research Association) 286

H

Henley's Twentieth Century Book of Recipes, Formulas and Processes 496

I

Industrial Fellowships of the Mellon Institute of Industrial Research 286
Industrial Management 119
Industrial Publishing 27

J

Journal of the British Institute of Metals 495

L

Laboratory Manual of Machine Shop Practice, A 495
Lead 27
Lead—The Precious Metal 203

M

Management's Handbook 454
Metal Statistics for 1924 244
Metallurgy of Aluminum and Aluminum Alloys 454
Modern Electro-Plating 119

N

Notes on Chemical Analysis..... 160

P

Personnel Management 27
Polishing and Plating of Metals 454
Popular Research Narratives 244
Principles of Electro-Plating and Electro-Forming 118
Proceedings of the American Society for Testing Materials 119

R

Regional Plan of New York and Its Environs 411
Research Information Surveys on Corrosion of Metals, No. 4-6. Zinc, Tin, Lead..... 496

S

Science of Metals, The 411
Steinmetz and His Discoverer..... 328
Strength and Structure of Steel and Other Metals 27
Structure of Crystals 496

T

Theoretical Metallurgy 160

V

Vanadium Ores 328

Y

Year Book of the American Bureau of Metal Statistics 244
Year Book of the National Association of Cost Accountants 328

TECHNICAL PAPERS

A

Amphoteric Character of Gelatine and Its Bearing on Certain Electrochemical Phenomena, The 497
Annealing of Brass Tubing in the Electric Furnace 497
Available Data on the Properties of Non-Ferrous Metals and Alloys at Various Temperatures 244

C

Corrosion in Mine Waters 27
Corrosion of Brass and Grain Size..... 27

D

Determination of Iridium in Platinum Alloys by the Method of Fusion with Lead..... 244

E

Economics of the Copper, Brass and Nickel-Silver Industries in 1924..... 329
Effect of Cheap Oxygen on Jewelry Soldering, and Some Other Processes, The..... 203
Effect of Hydrogen-ion Concentration on the Submerged Corrosion of Steel, The.. 368
Effect of Severe Cold Working on Scratch and Brinell Hardness 74
Electric Furnace for Continuous Hardening and Tempering Wire 497
Electrolytic Theory of Corrosion, Comments on Wilder D. Bancroft's Recent Paper on Above Topic 497
Engineering Standards Committee 329

H

Hazard of Flammable Aluminum Dust..... 26
High Voltage Phenomena 203
Industrial Applications of Metals at Various Temperatures 244

I

Influence of Emulsoids Upon the Rate of Solution of Iron, The 497
Internal Stress in Brass Tubing 329
Introduction of Carbonaceous Matter in Electro-Deposited Iron and Nickel, The... 497

L

Light Alloys of Aluminum..... 329

M

Metallurgical Education of University Rank in Great Britain 329
Metallurgical Research in Government Laboratories 329
Methods for the Recovery of Platinum, Iridium, Palladium, Gold and Silver from Jewelers' Waste 119
Methods of Conducting Corrision Tests.... 203
Methods of Testing on Various Temperatures and Their Limitations 368
Micro-Chemistry of Corrosion 497
Molding Sand Research..... 328

N

Nickel and Its Alloys..... 411
Notes on Corrosion Testing by Different Immersion Methods 497

P

Permanent Molds 328
Physical Characteristics of Specialized Refractories. Part V. 497
Physical Properties of Materials..... 329
Preparation of Artificial Sillimanite for Refractory Uses 497
Preparation of Metallic Tungsten and Some of Its Alloys 411
Preparation of Pure Alloys Including a Preliminary Study of Certain Electrical Properties of the System Aluminum-Magnesium 411
Present Commercial Methods of Melting Platinum 203
Present Tendencies in Electric-Brass Furnace Practice 244
Pure Zinc Anodes 329

R

Range Boilers and Expansion Tanks..... 368
Relation Between Tarnishing and Corrosion, The 454

S

Self Corrosion of Lead Cable Sheath..... 454
Some Aspects of the Platinum Stamping Law 203
Specifications for Lubricants and Liquid Fuels and Methods for Testing..... 368

T

Testing 119
Thermal Expansion of Molybdenum..... 368
Throwing Power, Cathode Potentials and Efficiencies in Nickel Deposition 497

W

Wet-Process Enamels for Cast Iron..... 119

CORRESPONDENCE AND DISCUSSIONS

A

Abuses in Zincing 117
American Copper in China 202
American Graphites 26
Appreciation from Japan 26

B

British Brass Foundries 160

E

Electro-Plating Problems 202

I

Institute of Electro-Plating..... 410

L

Life of Crucibles 118

M

Making Metal Patterns by Electro-Deposition 75
Mixing Molding Sand 410

N

Nickel Itch 202

O

Oil of Salt 286

P

Plating Auto Bumpers..... 410

R

Reading the Metal Industry..... 286

S

Streaky Brass Bedsteads 26

W

Working on Committees..... 159

SHOP PROBLEMS

A

Acid Dip, Coloring Brass by..... 412
Acid Pipes 75
Adding Manganese to Brass 330
Alloy, Aluminum Manganese..... 204
Alloy for Food Container..... 245
Aluminum Bobbins 287
Aluminum Castings, Cleaning..... 287
Aluminum Castings, Porous..... 455
Aluminum Manganese Alloy..... 204
Aluminum, Matte Finish on..... 245
Aluminum Pressure Cookers, Cracked..... 287
Aluminum Radiator Shells..... 204
Aluminum, Repairing 456
Aluminum Spider, Polishing 29
Aluminum Stampings, Polishing 413
Antimonial Lead 412

B

Babbitt, Drossy 120
Babbitt, Recovering 409
Babbitt, Removing Zinc from..... 370
Ball Furnishing Soap..... 28
Battery Plates, Lead from..... 204
Bearings, Rolling Mill 370
Beds, Refinishing Brass 413
Bells, Casting 29
Belt Buckles, Finishing 369
Black Dip for Brass..... 455
Black on Brass 28
Black on Duralumin 28
Black on Silver Plate 28
Blistered Gold and Silver..... 370
Blue on Steel, Bright..... 455
Bobbins, Aluminum 287
Box Metal, Car 75
Brass, Adding Manganese to 330
Brass Beds, Refinishing 413
Brass, Black on 28
Brass, Black Dip for 455
Brass, Brown on 369
Brass by Acid Dip, Coloring..... 412
Brass Castings, Drossy 412
Brass Castings, Exploded 29
Brass, Defective Journal 288
Brass, Dull Brush 455
Brass, Engraving on 120
Brass, High Tensile 75
Brass, Imitation Gold on..... 331
Brass Ingots, Smooth 29
Brass, Lead Coating Red 287
Brass, Nickel 246
Brass, Oxidizing Copper and 160

Brass Plate, Tarnished 456
Brass Plating Screws 412
Brasses, Locomotive 413
Brazing Solder 120
Bright Blue on Steel 455
Brine Solution, Metal for 499
Bronze, Casting 330
Bronze, Coloring Statuary 498
Bronze, Flux for Phosphor 370
Bronze, High Lead 161
Bronze, Imitation Manganese 370
Bronze, Segregated 370
Brown on Brass 369
Brush Brass, Dull 453
Brush Silver Solution 498
Buckles, Finishing Belt 369
Burnishing Soap, Ball 28

C

Cadmium Plate, Painting 288
Car Box Metal 75
Cast Gun Parts 455
Casting Bells 29
Casting Bronze 330
Casting Lighting Fixtures 120
Casting, White Metal 288
Castings, Cleaning Aluminum 287
Castings, Drossy Brass 412
Castings, Exploded Brass 29
Castings, Nickel on Small Die 246
Castings, Porous Aluminum 455
Castings, Slush 29
Chloride from Scrap Silver, Silver 162
Cleaning Aluminum Castings 287
Cloth, Metal Design on 205
Coating Red Brass, Lead 287
Cock Plug, Metal for Gas 288
Coloring Brass by Acid Dip 412
Coloring Copper 330
Coloring Statuary Bronze 498
Container, Alloy for Food 245
Cookers, Cracked Aluminum Pressure 287
Copper and Brass, Oxidizing 499
Copper, Coloring 330
Copper, Melting Phosphor 161
Copper, Mixing Lead and 75
Copper Plate, Streaky 456
Copper, Strip Nickel from 413
Cracked Aluminum Pressure Cookers 287
Cyanide Dip 245
Cyanide Dip 369

D

Defective Journal Brass 498
Dental Plates, Gold on 120
Depositing Magnesium 331
Design on Cloth, Metal 205
Die Castings, Nickel on Small 246
Dip, Coloring Brass by Acid 412
Dip, Cyanide 245
Dip, Cyanide 369
Dip for Brass, Black 455
Dross Samples, Sweating 456
Drossy Babbitt 120
Drossy Brass Castings 412
Dull Brush Brass 455
Duralumin, Black on 28
Dust from Grindings, Removing Emery 76

E

Ebony and Silver Finish 498
Electroplating Nickel Silver 245
Electro Strip Solution 498
Eliminating Zinc 204
Emery Dust from Grindings, Removing 76
Engraving on Brass 120
Engraving Steel Tape 369
Etching Stop-off 455
Exploded Brass Castings 29

F

Faucet Plugs, Grease for 287
Fine Grained Metal 245
Finish, Ebony and Silver 498
Finish on Aluminum, Matte 245
Finish on Nickel, High 204
Finish, Polychrome 76
Finishing Belt Buckles 369
Fixtures, Casting Lighting 120
Floor, Foundry on Top 499
Floor, Plating Room 288
Flowers, Metallizing 331
Flux for Phosphor Bronze 370
Food Container, Alloy for 245
Foundry on Top Floor 499
Furnace Installation, Melting 121

G

Gas Cock Plug, Metal for 288
Gold and Silver, Blistered 330
Gold, Imitation Platinum and White 121
Gold on Brass, Imitation 331
Gold on Dental Plates 120
Grained Metal, Fine 245
Grease for Faucet Plugs 287
Green Scum on Nickel 121
Grey Iron, Tinning 162
Grindings, Removing Emery Dust from 76
Gun Parts, Cast 455

H

High Finish on Nickel 204
High Lead Bronze 161
High Lead Mixture 413
High Tensile Brass 75
High Tensile Metal, Mixing 205
Holes, Silver Plating over 121

I

Imitation Gold on Brass 331
Imitation Manganese Bronze 370
Imitation Platinum and White Gold 121
Ingots, Smooth Brass 499
Installation, Melting Furnace 121
Iron, Tinning Grey 162
Itch, Nickel 75

J

Japanning Safety Pins 161
Journal Brass, Defective 498

L

Lead and Copper, Mixing 75
Lead, Antimonial 412
Lead Bronze, High 161
Lead Coating Red Brass 287
Lead from Battery Plates 204
Lead Mixture, High 413
Lead, Stripping Tin and 456
Licorice Powder 204
Lighting Fixtures, Casting 120
Lime, Vienna 205
Lining for Plating Tank 413
Lining, Tank 288
Linings, Metal for Tank 75
Locomotive Brasses 413
Locomotive Scrap 204

M

Magnesium, Depositing 331
Manganese Alloy, Aluminum 204
Manganese Bronze, Imitation 370
Manganese to Brass, Adding 330
Matte Finish on Aluminum 245
Melting Furnace Installation 121
Melting Phosphor Copper 161
Metal, Car Box 75
Metal Casting, White 288
Metal Design on Cloth 205
Metal, Fine Grained 245
Metal for Brine Solution 499
Metal for Gas Cock Plug 288
Metal for Tank Linings 75
Metal, Mixing High Tensile 205
Metal Molds 28
Metal Patterns, White 246
Metal Polish 499
Metal, Removing Zinc from White 162
Metal, Type 246
Metallizing Flowers 331
Mill Bearings, Rolling 370
Mixing High Tensile Metal 205
Mixing Lead and Copper 75
Mixing Molding Sand 331
Mixture, High Lead 413
Modeling Wax 331
Molding Sand, Mixing 331
Molds, Metal 28
Molds, Permanent 28
Molds, Plaster 162

N

Needles, Rusted 205
Nickel Brass 246
Nickel from Copper, Strip 413
Nickel, Green Scum on 121
Nickel, High Finish on 204
Nickel Itch 75
Nickel on Small Die Castings 246
Nickel on Stereotype 246
Nickel on Tin Sheet 76
Nickel, Pitted 76
Nickel Plating Plant, Operating a 161
Nickel Silver, Electroplating 245
Nickel Solution 121
Nickel Voltite 121

O

Operating a Nickel Plating Plant 161
Oxidizing Copper and Brass 499

P

Painting Cadmium Plate 288
Palladium Plating 76
Parts, Cast Gun 455
Patterns, White Metal 246
Permanent Molds 28
Phosphor Bronze, Flux for 370
Phosphor Copper, Melting 161
Pins, Japanning Safety 161
Pipes, Acid 75
Pitted Nickel 76
Plant, Operating a Nickel Plating 161
Plaster Molds 162
Plate, Black on Silver 28
Plate, Painting Cadmium 288
Plate, Streaky Copper 456
Plate, Tarnished Brass 456
Plates, Gold on Dental 120
Plates, Lead from Battery 204
Plates, Stripping 29
Plating Over Holes, Silver 121
Plating, Palladium 76
Plating Plant, Operating a Nickel 161
Plating Room Floor 288
Plating Screws, Brass 412
Plating on Steel, Tin 499
Plating Tank, Lining for 413
Plating Tank, Temporary 288
Platinum and White Gold, Imitation 121
Plug, Metal for Gas Cock 288
Plugs, Grease for Faucet 287
Polish, Metal 499
Polishing Aluminum Spider 29
Polishing Aluminum Stampings 413
Polychrome Finish 76
Porous Aluminum Castings 455
Powder, Licorice 204
Pressure Cookers, Cracked Aluminum 287

R

Radiator Shells, Aluminum 204
Rapid Silver Solution 162
Recovering Babbitt 499
Red Brass, Lead Coating 287
Refinishing Brass Beds 413
Removing Emery Dust from Grindings 76
Removing Zinc from Babbitt 370
Removing Zinc from White Metal 162
Repairing Aluminum 456
Rheostat Wire Sizes 205
Rolling Mill Bearings 370
Room Floor, Plating 288
Rusted Needles 205

S

Safety Pins, Japanning 161
Samples, Sweating Dross 456
Sand, Mixing Molding 331
Scrap, Locomotive 204
Scrap Silver, Silver Chloride from 162
Screws, Brass Plating 412
Scum on Nickel, Green 121
Segregated Bronze 370
Sheet, Nickel on Tin 76
Shells, Aluminum Radiator 204
Silver, Blistered Gold and 330
Silver Chloride from Scrap Silver 162
Silver, Electroplating Nickel 245
Silver Finish, Ebony and 498
Silver Plate, Black on 28
Silver Plating Over Holes 121
Silver Solution, Brush 498
Silver Solution, Rapid 162
Sizes, Rheostat Wire 205
Slush Castings 29
Small Die Castings, Nickel on 246
Smooth Brass Ingots 499
Soap, Ball Burnishing 28
Solder, Brazing 120
Solution, Brush Silver 498
Solution, Electro Strip 498
Solution, Metal for Brine 499
Solution, Nickel 121
Solution, Rapid Silver 162
Spider, Polishing Aluminum 29
Stampings, Polishing Aluminum 413
Statuary Bronze, Coloring 498
Steel, Bright Blue on 455
Steel, Tin Plating on 499
Steel Tape, Engraving 369
Stereotype, Nickel on 246
Stop-Off, Etching 455
Streaky Copper Plate 456
Strip Nickel from Copper 413
Strip Solution, Electro 498
Stripping Plates 29
Stripping Tin and Lead 456
Sweating Dross Samples 456

T

Tank Lining 288
Tank, Lining for Plating 413
Tank Linings, Metal for 75
Tank, Temporary Plating 288
Tape, Engraving Steel 369
Tarnished Brass Plate 456
Temporary Plating Tank 288
Tensile Brass, High 75
Tensile Metal, Mixing High 205
Tin and Lead, Stripping 456
Tin Plating on Steel 499
Tin Sheet, Nickel on 76
Tinning Grey Iron 162
Top Floor, Foundry on 499
Transformer 205
Type Metal 246

V

Vienna Lime 205
Voltite, Nickel 121

W

Wax, Modeling 331
White Gold, Imitation Platinum and 121
White Metal Casting 288
White Metal Patterns 246
White Metal, Removing Zinc from 162
Wire Sizes, Rheostat 205

Z

Zinc, Eliminating 204
Zinc from Babbitt, Removing 370
Zinc from White Metal, Removing 162

PATENTS

A

Abrasive Compound, 1,504,697. Joseph A. Menard, Seattle, Wash. 414
Abrasive Wheel Dresser, 1,486,844. Henry K. Spencer, Watertown, Mass. 206
Acid-Resisting Alloy, 1,473,208. Alvah W. Clement, E. Cleveland, Ohio. 30
Alloy, 1,496,269. Ityro Iytaka, Tokyo, Japan 333
Alloy, 1,494,254. Edward Kiam, New York and M. G. Collins, Scarsdale, N. Y. 332
Alloy and Apparatus Made Therefrom, 1,510,242. Aladar Pacz, Cleveland Heights, Ohio 509

Alloy Comprising Iron, Nickel, Chromium, Tungsten or Molybdenum, 1,504,338. Pierre Girin, Paris, France 414
Alloy Flux for Soldering Aluminum and Process for Forming Same, 1,483,327. Wm. G. Bolus, Rhinelander, Wis. 163
Alloys, Method of Making, 1,494,393. Richard Walter, Dusseldorf, Germany 332
Aluminum Alloy, 1,480,846. Alfred Von Zeerleder, Neuhausen, Switzerland 77
Annealing Furnace, 1,481,338. C. C. Baldwin, Perth Amboy, N. J. 122
*Anode and Carrier Therefor, 1,478,853. Harry L. Haas, New York, N. Y. 77
*Anode, Electroplating, 1,474,469. Edwin M. Beck, Greensberg, Ind. 30
Anti-Friction Bearings and Compounds, Process of Manufacturing, 1,482,414. Carl Schmidt, Berlin-Tegel, Germany 163
*Antifriction Metals, Process for Making, 1,479,859. William Koehler, Cleveland, Ohio 77
*Apparatus, Electroplating, 1,475,198. Louis Potthoff, deceased. By Hamilton Trust Company, Brooklyn, N. Y. 30
Apparatus for Applying Coating, 1,475,372. Herbert W. Day, Wollaston, Mass. 30

B

Bearing Metal Alloy, 1,502,321. Karl Muller and Wilhelm Sander, Essen, Germany 371
Bearing Metals and Process of Using Same, Hardening Alloy for, 1,502,425. Robert Hughes Evans, Detroit, Mich. 371
*Blowpipe for Metal Soldering, 1,485,715. Frederick Robinson, New York, N. Y. ... 163
Boric Acid in Nickel-Containing Solution, Method of Determining, 1,504,207. Edwin M. Baker, Ann Arbor, Mich. 414
Brazing and Welding, Compound for, 1,502,144. Arthur J. Knowles, Wilmington, Del. 371
Buffing Wheel, 1,504,272. Charles P. Schlegel, Rochester, N. Y. 414
Buffing Wheels, Method of Cutting Materials for, 1,500,990. Wesley F. Hall, Matawan, N. J. 371

C

*Carboy Lift, 1,487,669. R. B. Shiffner, Kansas City, Mo. 206
Casting Dental Plates in Metal, Apparatus for, 1,475,996. Herbert Is. Holiday, and F. W. Munn, Melbourne, Victoria, Australia 31
Casting Light Metal Alloys, Method of, 1,476,192. Wm. R. Veazey, Cleveland, Ohio, and E. C. Burdick, Midland, Mich. 31
Casting Machine, 1,498,675. Erwin L. Wilke, Hammond, Ind. 371
Casting, Method of, 1,491,817. Charles Pack, Elmhurst, N. Y. 289
Castings of Aluminum Alloys, Making, 1,508,556. Zay Jeffries, Cleveland Heights, Ohio, and R. S. Archer, East Cleveland, Ohio 457
Castings, Method of and Apparatus for Making, 1,508,889. John Kralund, and C. H. Duckworth, Brooklyn, N. Y. Marcus Stern, Toledo, Ohio 457
*Castings, Process and Device for Making Sharply-Defined, 1,477,508. Hugo Lohmann, Berlin-Johannisthal, Germany 31
Chromium or Alloys of Chromium, Method for Producing, 1,508,557. B. M. Sture Kalling, and Sven D. D. Trollhattan, Sweden 457
*Clamp for Lead Molds, 1,486,622. Chester M. Angell, Chicago, Ill. 163
Cleaning Metal Surfaces, Material for and Method of, 1,484,690. P. H. Walker and J. H. Bower, Washington, D. C. 163
Coating Metal Articles, Process and Apparatus for, 1,496,309. Harvey F. Girvin, Ansonia, Conn. 333
Coating Metals, Flux Therefor, Etc., Method of, 1,501,293. Richard Staack, N. Bergen, N. J. 371
Coating, Method of, 1,495,487. John Bertrand Johnson, Elmhurst, N. Y. 333
*Coating Sheet Steel with Aluminum, Process of, 1,488,553. Samuel Peacock, Wheeling, W. Va. 247
*Cold Spurting of Tubes and Thin-Walled Metal Pipes of Lead, Tin and Especially Aluminum, Method for the, 1,480,843. Fritz Singer, Nuremberg, Germany 122
*Compacting Head for Wire-Covering Machines, 1,489,820. Wm. E. Cook, St. George, N. Y 247
Compound, Rust-Removing, 1,473,529. J. J. Varn Buhler, Detroit, Mich. 30
Container, Evacuated, 1,498,908. Colin G. Fink, East Orange, N. J. 371
Conveying Mechanism, 15,754 Reissued. F. T. Taylor, Matawan, N. J. 122
Copper and the Product Thereof, Process for Treating, 1,502,857. S. B. Leiter, Schenectady, N. Y. 414
Copper, Method of Treating, 1,507,340. R. J. Cunningham and Geo. H. King, Salt Lake City, Utah 457
Copper Trolley Wheels, Method of Producing, 1,494,409. Wm. S. Bidle, Cleveland, Ohio 332
Cores for Foundry Work, Manufacture of, 1,477,064. Emil Kleinschmidt, Frankfort-on-the-Main, and C. Fohr, Miesbach, Oberbayern, Germany 31
*Cutting Metal, Apparatus for and Method of, 1,479,056. John T. Cummings, Benj. H. Daulton, Frank W. Taylor, Clarence J. Robinson, all of Wilmington, Ohio. ... 77

D

Dental Casting Machine, 1,493,692. Thomas A. Nixon, Atlanta, Ga. 332
Die Casting and Method of Welding Same to a Metallic Surface, 1,491,879. Charles Pack, Elmhurst, N. Y., and S. R. Kuech, Brooklyn, N. Y. 289
*Die-Casting Apparatus, 1,476,257. J. Kralund and C. H. Duckworth, Brooklyn, N. Y. 31
Die-Casting Machine, 1,509,458. Reuben H. Williams, Flint, Mich. 457
Die-Casting Metal, 1,506,772. Charles Pack, Elmhurst, N. Y. 457
Die-Casting, Method of, 1,491,816. Charles Pack, Elmhurst, N. Y. 289
Die Casting, Process for, 1,494,103. Otto De Cardy, Chicago, Ill. 332
Die for Die-Casting, 1,510,902. H. Rau, Hamilton Beach, N. Y. 500
Drawbench Apparatus, 1,496,137. August Sundh, Hastings-on-Hudson, N. Y. 333
Drawbench for Metal Tubing, 1,496,125. David C. Larson, Yonkers, N. Y. 333

E

*Electric Furnace, 1,478,375. Morris H. Bennett, Waterbury, Conn. 77
*Electric Furnace, 1,481,228. Tito Rondelli, London, England 122
Electric Furnace, 1,506,281. Thaddeus F. Baily, Alliance, Ohio 414
Electrode, 1,510,541. Charles L. Burdick, New York, N. Y. 500
Electrode Element for Galvanic Batteries and Method of Producing the Same, 1,486,955. L. R. S. Dunham, Bloomfield, N. J. 206
Electrodeposited Article and Method of Making Same, 1,513,119. Charles P. Madsen, New York, N. Y. 500
Electrodepositing Lead Upon Iron, Process for, 1,505,109. B. S. Summers, Port Huron, Mich. 414
Electrodeposition, Process of, 1,475,973. B. S. Summers, Port Huron, Mich. 31
Electrode Suspension Device, 1,484,194. Oscar E. Servis, Chicago, Ill. 163
*Electrogalvanizing, Apparatus for, 1,484,653. F. Kirschner, Vienna, Austria 163
Electrolytic Metal and Apparatus Therefor, Art of Making, 1,493,722. F. A. Eustis, Milton, Mass. 163
Electrolytic Process, 1,487,124. James R. Stack, Perth Amboy, N. J. 206
Electrolytic Refining of Tin, 1,487,136. H. H. Alexander, Westfield, N. J. ... 206
Electrolytic Tin, 1,487,111. Clarence P. Linville, Elizabeth, N. J. 206
Electroplating Apparatus, 1,501,946. Wesley F. Hall, Matawan, N. J. 371
Electroplating Apparatus, 1,504,700. J. L. Mujica, Brooklyn, N. Y. 414
Electroplating Apparatus, 1,505,424. F. G. Purinton, Waterbury, Conn. 414
Electroplating Machine, 1,509,534. G. Todd, Millburn, N. J. 457
*Electroplating, Method of, 1,473,060. Edward N. Taylor, St. Louis, Mo. 30
Enameled Ware, 1,496,505. Harold F. Whittaker, Carneys Point, N. J., and T. Baker, Wilmington, Del. 333
Enameling of Metals, Wires and Metal Structures, Process for, 1,495,632. Louis De Raphelis-Soissan, Marseilles, France .. 333
*Extruding Brass and Like Material, Method of and Means for, 1,479,437. W. R. Webster, Bridgebort, Conn. 77

F

*Finished Coat on Strips of Metal, Apparatus for and Method of Producing a, 1,490,888. Daniel J. Cronin, Derby, Conn. 289
Forming Brass Spring Strips for Radiators, Machine for, 1,511,349. George H. Lober, Toledo, Ohio 500
Forming Metal Tubes, Machine for, 1,510,586. Leonard D. Davis, Erie, Pa. 500
Foundry-Sand Mixer, 1,508,031. Herbert S. Simpson, Chicago, Ill. 457
Furnace for Melting Stereo and Similar Metals, and Other Materials, 1,483,030. Herbert W. V. Wilson, Meols, England .. 163

G

*Galvanizing Chain, Apparatus for, 1,489,393. Winford G. Milne, Hamilton, Ont., Can. 247
Galvanizing Machine, 1,498,290. Harley D. Pennington, Pittsburgh, Pa. 371
Grinding Machine, 1,483,748. Francis C. Sanford, Bridgeport, Conn. 163

H

Heat Treating Metal-Coated Materials, Apparatus for, 1,495,175. Joseph L. Herman, Peroria, Ill. 333

I

*Induction Furnace, 1,479,582. Charles [illegible] Brayton, Jr., Cleveland, Ohio 77
*Insulated Wire-Making Machine, 1,489,[illegible] Wm. E. Cook, St. George, N. Y. 247
Iron-Tin Alloy, Process of Forming, 1,49[illegible] 133. H. H. Alexander, Westfield, N. [illegible] 500

L

Lacquering Machine, 1,500,467. Wm. [illegible] Pond, Providence, R. I. 371
Lead-Alkali-Metal Alloy, Process of Making, 1,509,227. Wm. S. Calcott, Penn Grove, N. J. 457
Lead Alloys, Manufacture of, 1,500,954. Walter Mathesius and Hans Mathesius, Charlottenburg, Germany 371
Lead Molding for Electrotypes, Process and Backing for Use in, 1,505,082. Harry M. Blaets, Philadelphia, Pa. 414
Lining for Metallurgical Purposes, Refractory, 1,492,685. Edwin W. Hale, Greenwich, Conn. 332
Lock for Foundry Flasks, 1,493,117. George F. Laughran, Boston, Mass. 332

M

*Machine for Casting Bushings, 1,474,484. Thure Larsson, Worcester, Mass. 30
Magnesium Alloys, Method for Rolling, 1,480,870. Felix Thomas, Frankfort-on-the-Main, Germany 122
Magnesium and Alloys Comprising the Same, Treating, 1,477,922. Emil Woolner, Schwanheim-on-the-Main, and Felix Thomas, Frankfort-on-the-Main, Germany 31
Magnesium and Magnesium Alloys by Etching, Method of Coloring, 1,480,869. Felix Thomas, Frankfort-on-the-Main, Germany 122
Manganese or Manganese Alloys Poor in Carbon and Silicon, Process for the Manufacture of, 1,480,267. B. M. S. Kalling and Sven D. Danieli, Trolhattan, Sweden 122
Metal and Its Manufacture, 1,508,241. Aladar Pacz, Cleveland, Ohio 457
Metal and Process of Making It, Protected, 1,501,887. Frederick M. Crapo, Muncie, Ind. 371
Metal-Bearing Solution, Process for Recovering Values from, 1,492,283. F. M. Becket, New York 289
Metal Bearing Solutions, Process for Recovering Vaules from, 1,492,282. F. M. Beckett and A. L. Feild, New York 289
Metal-Disintegrating Apparatus, 1,501,449. Everett J. Hall, Passaic, N. J. 371
Metal for Coating, Process and Material for Preparing, 1,503,443. James H. Gravell, Elkins Park, Pa. 414
Metal Powder or Dust, Process for the Production of, 1,495,961. Minton H. Newell, Palo Alto, Calif., and Evald Anderson, Alhambra, Calif. 333
Metal Sheets, Wire, Tubes, Cylinders, and Other Articles, Continuous Automatic Process for the Production of, 1,494,152. Sherard Osborn Cowper-Coles, Sunbury-on-Thames, England 332
*Metal-Working Torch, 1,485,032. A. F. Jenkins, Baltimore, Md. 163
Metallic Coatings on Metals, Process for the Production of Glossy, 1,491,381. Alexander Classen, Aachen, Germany 289
Metallic Leaf, Process of Making Decorative, 1,490,891. J. A. C. Fichtmueller, Stapleton, N. Y. 289
*Mold for Annular Castings, 1,490,482. Wm. J. Reardon, Detroit, Mich. 247
*Molding, 1,489,726. John R. Wood, Newark, N. J 247
Molding, 1,491,754. John Scherner, Milwaukee, Wis. 289
*Molding Apparatus, 1,480,748. Henry L. Demmler, Kewane, Ill. 122
*Molding Machine, 1,479,287. John W. Dearsley, Racine, Wis. 77
*Molding Machine, 1,480,749. Henry L. Demmler, Kewanee, Ill. 122
Molding Machine, 1,492,912. F. J. Wood, Des Moines, Iowa 332
Molding Machine, 1,495,090. Wilfred Lewis, Haverford, Pa. 332
*Molding Machine, Foundry, 1,479,958. Robert Duffus, Lutterworth, England 77
*Molding Machine, Rock-Over, 1,490,280. George E. Pickup, Newark, Ohio 247
Molding Machine, Rock-Over, 1,493,754. Wm. P. Krause, Chicago, Ill. 332
Molding, Method of, 1,505,724. Wm. H. Nichols, Wilkinsburg, Pa. 414
*Molds, Method of and Machine for Making, 1,480,750. Henry L. Demmler, Kewanee, Ill. 122
*Molten Steel or Metal Into Ingot or Like Molds, Pouring or Teeming of, 1,474,261. Harold H. Hosack, Furnham, England ... 30

N

Nickel Alloy, 1,501,906. Noak Victor Hybinette, New York, N. Y. 371
Nickel from Impure Oxides of Nickel, Process of Manufacture of Ingots of pure, 1,480,212. Jacques de Fonds Lamothe, Paris, France 122

Nickel Plating, Process of and Means for, 1,504,206. Edwin M. Baker, Ann Arbor, Mich. 414
Non-Ferrous Melting Furnace, 1,509,277. Conrad Werra, Waukesha, Wis. 457
Nozzle for Atomizing Molten Metal, 1,511,215. J. H. Calbeck, Joplin, Mo. 500

P

*Pickling Apparatus, 1,490,515. Frank D. Kuiczke, Woodlawn, Pa. 289
Pickling Metal Plates and Blanks, Machine for, 1,491,195. Edward W. Burgess, Milwaukee, Wis. 289
Polishing Composition, 1,492,698. James M. Owen, Emerson, Ark. 332
Polishing Metals, Means for, 1,498,642. Thorvald Olsen Aalgaard, Ganddalen, Norway 371
Polishing or Buffing Device, 1,510,116. Arthur L. Van Meter, New Orleans, La. 500
Polishing Wheel, 1,507,836. Clarence R. King, Worcester, Mass. 457
Pure Chromium by Electrolysis, Process of Producing, 1,496,845. George Grube, Stuttgart, Germany 333

R

Recovering Occluded Tin, 1,487,135. H. H. Alexander, Westfield, N. J. 206
*Recovering Tin, Process of, 1,487,125. J. R. Stack, Perth Amboy, N. J. 206
Recovering Tin, Process of, 1,487,134. H. H. Alexander, Westfield, N. J. 206
Refined Copper from Copper Oxide, Treatment of, 1,508,243. Walter G. Perkins and W. H. Beasley, London, England. 457
Refining Tin and Antimony, Process for, 1,475,422. George Bonnard, Plombieres St. Marcel, France 30
Refractory Article and Method of Making the Same, 1,483,507. C. J. Brockbank, Philadelphia, Pa. 163
*Removing Paint, Enamel, Etc., Method of, 1,476,909. L. C. Moore and W. J. Jackson, Dallas, Texas 31
Rust and Grease Remover, 1,496,506. Glen L. Williams, Detroit, Mich. 333
Rust-Dissolving Liquid, 1,510,067. Erik J. Norberg, Everett, Wash. 500
Rustproofing by Coating with Cadmium, Process of, 1,504,298.* Wm. A. Wissler and Chad H. Humphries, Kokomo, Ind. 414
Rustproofing Process and Compound, 1,493,012. Charles E. Abraham, Detroit, Mich. 332

S

*Safety Device for Pyrometers, 1,489,020. Richard P. Brown, Philadelphia, Pa. 247
Sand-Blast Apparatus, 1,491,663. C. E. Billings, New Haven, Conn., and D. S. Sammis, Stratford, Conn. 289
Sand-Blasting Apparatus, 1,511,025. George W. Christoph, Warehouse Point, Conn. 500
Scrap Battery Plates, Method of Recovering, 1,492,241. C. C. Carpenter, Niagara Falls, N. Y. 289
Scrap Metal and Recovering By-Products Therefrom, Process of Melting, 1,502,129. Geo. H. Starmann and Henry Lindenberger, Chicago, Ill. 371
Sheet-Metal Spinning Machine, 1,500,261. George E. Page, Rochester, N. Y. 371
Sherardizing, Method of, 1,513,349. Otho V. Stewart, Wilkinsburg, Pa., and L. McCulloch, Pittsburgh, Pa. 500
Slabs, Art of Casting Metal, 1,491,964. Egbert Moxham, Great Neck, N. Y. 289
Smelting Apparatus, 1,505,495. R. Rodrian, New York 414
*Soldered Tube, Method of Manufacturing, 1,475,258. Harry W. Bundy, Detroit, Mich. 30
Soldering Aluminum, Device for, 1,483,337. M. S. Corsat, Bachet de Pesay, Carouge, Switzerland 163
*Soldering Apparatus, 1,479,783. Frank P. Bentley, Warren, Ohio 77
Soldering Iron, 1,478,868. Anton E. Butkovich, Chicago, Ill. 77
*Soldering Machine, 1,478,696. Herman O. Behme, New York, N. Y. 77
Soldering Machine, 1,493,035. Charles Gueritey, Passaic, N. J. 332
*Soldering, Means for, 1,490,087. Julius Brenzinger, Fairfield, Conn. 247

T

Testing Machine, 1,496,838. B. C. Batchelder, Brooklyn, N. Y. 333
Testing Platinum Alloys, Method of and and Apparatus for, 1,498,073. Adolph Cohn, New York, N. Y. 333
Thrust Bearing and Method of Making Same, 1,496,809. Carl W. Johnson, Cleveland, Ohio 333
Tin Sinter and Method of Producing Same 1,487,132. H. H. Alexander, Westfield, N. J. 206
*Treating Metal, Method for, 1,474,933. R. E. Bradley and C. R. Webber, Baltimore, Md. 30
Treating Metals, Compound for and Method of 1,485,025. Matthew Green, Detroit, Mich. 163
Treating Metals, Method of, 1,497,011. Gustav F. Gerdts, Bremen, Germany. 333
Trolley-Wheel Blank and Method of Making Same, 1,494,411. Wm. S. Bidle, Cleveland, Ohio 332
Trolley Wheels, Method of Making, 1,494,410. Wm. S. Bidle, Cleveland, Ohio. 332
Tube and Method of Making Tubes, 1,506,971. Harry W. Bundy, Detroit, Mich. 457
Turbine Blades, Alloy for, 1,481,782. Ityro Iytaka, Sugamoachi, Japan 122

U

Uniting Copper to Steel, Process of, 1,511,195. John B. Austin, Cleveland, Ohio. 500
Uniting Copper to Steel, Process of, 1,511,197. John B. Austin, Cleveland, Ohio. 500
Uniting Metal, Process of, 1,511,194. John B Austin, Cleveland, Ohio 500
Uniting Metals, Process of, 1,511,196. John B. Austin, Cleveland, Ohio 500

W

*Welding Aluminum, 1,489,008. R. D. Mershon, N. Y., and P. A. Ross, Norwalk, Conn. 247
*Wheel, Buffing, 1,473,765. T. W. Hanrath, Chicago, Ill. 30
*Workholder for Polishing Machines, 1,487,506. S. Blickman, Far Rockaway, N. Y. 200

Z

*Zinc Cylinders for Primary Batteries, Process for the Manufacture of, 1,477,109. S. O. Cowper-Coles, Sunbury-on-Thames, England 31
Zinc-Electroplated Articles, 1,497,265. Joseph Haas, Jr., Muncie, Ind. 333
Zinc, Process for Working, 1,492,230. W. M. Towne, Brooklyn, N. Y. 289

EQUIPMENT

A

*Acid Pump, Thompson 450
*Air-Tight Blast Gate 335
Alloy, New Aluminum 165
Aluminum Alloy, New 165
Aluminum Ball, Spun 460
*Aluminum Melting Furnaces 293
*Angle and Eye Bending Machine, Wallace Improved Combination 373
*Annealing Wire and Strip, A New Plant for 78
Anti-Corrosive Solution 124
*Automatic Buffing Machine 417

B

*Baird Six-Spindle Chucking Machine 248
Ball, Spun Aluminum 460
*Barrels, Plating 374
Bearing Material, Durex 502
*Belke Commutating Rheostats 34
*Belke Porcelain Enameled Racks 34
*Bending Machine, Wallace Improved Combination Angle and Eye 373
*Blast Equipment, Sand 459
*Blast Gate, Air-Tight 335
*Box, Worm 373
*Brass Tubes, New Lock-Joint 372
*Brazing Machine, Electric 249
British Oxidizing Process, New 125
British Rust-Proofing, New 124
*Buffing Machine, Automatic 417
*Buffing Machine, Tube 35
*Buffs, Symmetric 35
Burns, Butesin Picrate for 208
Butesin Picrate for Burns 208

C

*Chucking Machine, Baird Six-Spindle 248
Cleaner, Metex Metal 32
*Cleaner, Window 503
*Cleaning Machine, Polishing Wheel 209
*Cleaning Parts for Plating 124
*Combination Angle and Eye Bending Machine, Wallace Improved 373
*Commutating Rheostats, Belke 34
*Comparator, The Double-Wedge 164
Compound, New Tripoli 35
*Continuous Electric Core Ovens 501
*Core-Making Machine, The Skeppstedt Multiple 291
*Core Ovens, Continuous Electric 501
Corrosive Solution, Anti- 124
*Crucible Pouring Device 502
Crystallizing Lacquer, Hilo 80
Cutting Torch, New Metal 335

D

*Deposition, Rebuilding by Electro- 123
*Device, Crucible Pouring 502
*Double-Wedge Comparator, The 164
*Driven Polishing Lathe, New Motor 334
*Driven Swing Frame Grinder, Motor 415
Ductile Tantalum 78
Durex Bearing Material 502
*Duty Polishing, High Speed Heavy 207

E

*Electric Brazing Machine 249
*Electric Core Ovens, Continuous 501
*Electric Furnace, New 32
*Electric Furnaces, Small 501
*Electric Glue Pot 248
*Electric Solder Pot 80
Electric Wire, History of Phono- 416
*Electro-Deposition, Rebuilding by 123
*Enamel Strainer, Paint and 166
*Enameled Racks, Belke Porcelain 34
*Enclosed Self-Ventilating Motors 460
*Equipment, Sand Blast 459
*Equipment, Tinning 125
Equipment, Welding 80
*Eureka Sprayer, New 374
Everbrite Metal 458
Exhibit, Link-Belt's 417
Exhibit, Monarch 417
Exhibit, National. 417
Exhibit, Pangborn 373
*Eye Bending Machines, Wallace Improved Combination Angle and 373

F

Finish and Rust Proofing, New. 80
Foundry Riddle, Gyratory 417
*Frame Grinder, Motor Driven Swing 415
*Furnace for Refiners, Melting 208
*Furnace, Johnson Melting 502
*Furnace, New Electric 32
*Furnaces, Aluminum Melting 293
*Furnaces, Recuperator 458
*Furnaces, Small Electric 501

G

*Gate, Air-Tight Blast 335
*Glue Pot, Electric 248
*Gooseneck Welding Torch 164
*Granulated Nickel Salts, Refined 35
*Grinder, Motor Driven Swing Frame 415
Grinding Lathes, New Polishing or 416
*Gun, New Spray 79
Gyratory Foundry Riddle 417

H

*Heavy Duty Polishing, High Speed 207
*High Speed Heavy Duty Polishing 207
Hilo Crystallizing Lacquer 80
History of Phono-Electric Wire 416
House, New Plating Supply 80

I

*Improved Combination Angle and Eye Bending Machine, Wallace 373
Installation and Trouble Service 416

J

*Johnson Melting Furnace 502
*Joint Brass Tubes, New Lock- 372

L

Lacquer, Hilo Crystallizing 80
Lacquer, New 34
*Lathe, New Motor Driven Polishing 334
Lathes, New Polishing or Grinding 416
Lining, New Tank 374
Link-Belt's Exhibit 417
*Lock-Joint Brass Tubes, New 372

M

*Machine, Automatic Buffing 417
*Machine, Baird Six-Spindle Chucking 248
*Machine, Electric Brazing 249
*Machine, Polishing Wheel Cleaning 209
*Machine, Sand 459
*Machine, The Skeppstedt Multiple Core-Making 291
*Machine, Tube Buffing 35
*Machine, Wallace Improved Combination Angle and Eye Bending 373
*Magnetic Separator 125
Material, Durex Bearing 502
*Melting Furnace for Refiners 208
*Melting Furnace, Johnson 502
*Melting Furnaces, Aluminum 293
*Melting Metal at 2900° C (5252° F.) 290
*Mercury Vapor, Power from 33
*Metal at 2900° C (5252° F.), Melting 290
Metal Cleaner, Metex 32
Metal Cutting Torch, New 335
Metal, Everbrite 458
*Metal, Modified Monel 165
Metal Molds, Wash for 416
Metex Metal Cleaner 32
*Modified Monel Metal 165
Molds, Wash for Metal 416
Monarch Exhibit 417
*Monel Metal, Modified 165
Mop, New Potash 373
*Motor Driven Polishing Lathe, New 334
*Motor Driven Swing Frame Grinder 415
*Motors, Enclosed Self-Ventilating 460
*Multiple Core-Making Machine, The Skeppstedt 291

N

National Exhibit 417
*Nickel Salts, Refined Granulated 35

O

*Operations Requiring Specialized Treatment, Stamping 415
*Ovens, Continuous Electric Core 501
Oxidizing Process, New British 125

P

*Paint and Enamel Strainer 166
Pangborn Exhibit 373
Paper Pulley, New 417
*Parts for Plating, Cleaning 124
Phono-Electric Wire, History of 416

Picrate for Burns, Butesin 208
*Plant for Annealing Wire and Strip, A New 78
*Plating Barrels 374
*Plating, Cleaning Parts for 124
Plating, Rectifier for 80
Plating Supply House, New 80
*Polishing, High Speed Heavy Duty 207
*Polishing Lathe, New Motor Driven 334
Polishing or Grinding Lathes, New..... 416
*Polishing Wheel Cleaning Machine 209
*Porcelain Enameled Racks, Belke 34
*Pot, Electric Glue 248
*Pot, Electric Solder 80
Potash Mop, New 373
*Pouring Device, Crucible 502
*Power from Mercury Vapor 33
Process, New British Oxidizing 125
Process, New Zincing 334
Proofing, New Finish and Rust..... 80
Pulley, New Paper 417
*Pump, Thompson Acid 459

R

*Racks, Belke Porcelain Enameled 34
*Rebuilding by Electro-Deposition 123
Rectifier for Plating 80
*Recuperator Furnaces 458
*Refined Granulated Nickel Salts 35
*Refiners, Melting Furnace for 208
Refractories, Super 502
*Requiring Specialized Treatment, Stamping Operations 415
*Rheostats, Belke Commutating 34
Riddle, Gyratory Foundry 417
Rust-Proofing, New British 124
Rust Proofing, New Finish and 80

S

*Salts, Refined Granulated Nickel 35
*Sand Blast Equipment 459
*Sand Machine 459
*Schoop Process Developments 336
*Self-Ventilating Motors, Enclosed 460
*Separator, Magnetic 125
Service, Installation and Trouble 416
*Six-Spindle Chucking Machine, Baird 248
*Skeppstedt Multiple Core-Making Machine, The 291
*Small Electric Furnaces 501
*Solder Pot, Electric 80
Solution, Anti-Corrosive 124
*Specialized Treatment, Stamping Operations Requiring 415
*Speed Heavy Duty Polishing, High 207
*Spindle Chucking Machine, Baird Six- 248
*Spray Gun, New 79
*Spray Tank 79
*Sprayer, New Eureka 374
Spun Aluminum Ball 460
*Stamping Operations Requiring Specialized Treatment 415
*Strainer, Paint and Enamel 166
*Strip, A New Plant for Annealing Wire and 78
Super Refractories 502
Supply House, New Plating 80
*Swing Frame Grinder, Motor Driven..... 415
*Symmetric Buffs 35

T

Tank Lining, New 374
*Tank, Spray 79
Tantalum, Ductile 78
*Thompson Acid Pump 459
*Tight Blast Gate, Air- 335
*Tinning Equipment 125
*Torch, Gooseneck Welding 164
Torch, New Metal Cutting 335
*Treatment, Stamping Operations Requiring Specialized 415
Tripoli Compound, New 35
Trouble Service, Installation and 416
*Tube Buffing Machine 35
*Tubes, New Lock-Joint Brass 372

V

*Vapor, Power from Mercury 33

W

*Wallace Improved Combination Angle and Eye Bending Machine 373
Wash for Metal Molds 416
*Wedge Comparator, The Double- 164
Welding Equipment 80
*Welding Torch, Gooseneck 164
*Wheel Cleaning Machine, Polishing 209
*Window Cleaner 503
*Wire and Strip, A New Plant for Annealing 78
Wire, History of Phono-Electric 416
*Worm Box 373

Z

Zincing Process, New 334

EQUIPMENT—FIRMS

A

Abbott Laboratories, The, Chicago, Ill. Butesin Picrate for Burns..... 208
Acme Manufacturing Company, 1645 Howard street, Detroit, Mich. *Automatic Buffing Machine 417
Acme Manufacturing Company, 355 Howard street, Detroit, Mich. *Tube Buffing Machine 35
Ajax Electrothermic Corporation, Trenton, N. J. *Melting Metal at 2900° (5262° F) 200
American Electric Motors, Inc., Milwaukee, Wis. *Enclosed Self-Ventilating Motors . 460
American Machine & Manufacturing Company, 441 Folsom street, San Francisco, Calif. Rectifier for Plating 80
Ashcroft Manufacturing Company, Sales Department, 100 E. 42nd street, New York City. *Modified Monel Metal 165

B

Baird Machine Company, Bridgeport, Conn. *Baird Six-Spindle Chuckling Machine... 248
Bastian Blessing Company, 246 E. Ontario street, Chicago, Ill. *Gooseneck Welding Torch 164
Belke Manufacturing Company, 2952 W. Van Buren street, Chicago, Ill. *Belke Commutating Rheostats 34
Belke Manufacturing Company, 2952 W. Van Buren street, Chicago, Ill. *Belke Porcelain Enameled Racks 34
Best Pulley Manufacturing Company, 400 Talcott avenue, St. Louis, Mo. New Pulley 417
Booth Electric Furnace Company, Chicago, Ill. *Small Electric Furnaces 501
Bridgeport Brass Company, Bridgeport, Conn. History of Phono-Electric Wire... 416
Buffalo Forge Company, 490 Broadway, Buffalo, N. Y. *Stamping Operations Requiring Specialized Treatment 415
Byrd, R. E., Erie, Pa. Wash for Metal Molds 416

C

Callender Soldering Process Company, 12 S. Jefferson street, Chicago, Ill. New Tank Lining 374
Calender Soldering Process Company, 12 South Jefferson street, Chicago, Ill. *Tinning Equipment 125
Classen, Alexander, Aachen, Germany. New Zincing Process 334
Cleveland Armature Works, 4732 St. Clair avenue, Cleveland, Ohio. *High Speed Heavy Duty Polishing 207
Coleman Company, F. A., Cleveland, Ohio. *Continuous Electric Core Ovens..... 501
Coleman Company, F. A., 6539 Metta Avenue, Cleveland, Ohio. *Aluminum Melting Furnaces 293
Combustion Engineering Corporation, New York. *Recuperator Furnaces 458
Crown Rheostat & Supply Company, 1910 W. Park avenue, Chicago, Ill. *Thompson Acid Pump 459
Crumpton & Company, W. D., 8-10 Bridge street, New York City. *Electric Brazing Machine 249
Curtiss Bay Copper & Iron Works, Baltimore, Md. Everbrite Metal 458

D

Daniels & Orben Company, 81 Walker street, New York City. *Plating Barrels..... 374
Day Manufacturing Company, S. A., Buffalo, N. Y. Anti-Corrosive Solution 124
De Vilbiss Manufacturing Company, 266 Phillips ave., Toledo, Ohio. *New Spray Gun 79
Diamond Machine Company, Providence, R. I. *Motor Driven Swing Frame Grinder 415

E

Eureka Pneumatic Spray Company, Inc., 87-28 130th street, Richmond Hill, L. I. *New Eureka Sprayer 374
Fansteel Products Company, North Chicago, Ill. Ductile Tantalum 78
Fescol, Ltd., Penarth St., Canterbury Road, Old Kent Road, London, S. E. 15, England. *Rebuilding by Electro-Deposition 123

G

General Electric Company, Schenectady, N. Y. *Power from Mercury Vapor..... 33
General Electric Company, Schenectady, N. Y. Welding Equipment 80
Greater Service Company, 331 Broad street, Newark, N. J. New Lacquer 31

H

Hanson & Van Winkle Company, New York. New Potash Mop 373
Hilo Varnish Corporation, Brooklyn, N. Y. Hilo Crystallizing Lacquer 80

J

Jaquiery, William, 17 Edgewood avenue, Waterbury, Conn. *New Lock-Joint Brass Tubes 372
Johnson Gas Appliance Company, Cedar Rapids, Iowa. *Johnson Melting Furnace. 502
Jones Foundry and Machine Company, W. A., Chicago, Ill. *Worm Box 373

K

Kopf, M. G., 612 Schwind Building, Dayton, Ohio. *Polishing Wheel Cleaning Machine 209
Kyle & Company, George W., Grand & Thompson Sts., N. Y. City. *Symmetric Buffs 35

L

Lava Crucible Company, Pittsburgh, Pa. Super Refractories 502
Leeds Electrical Construction Company, Ltd., Charmouth street, Leeds, England. *A New Plant for Annealing Wire and Strip 78
Link-Belt Company, Chicago, Ill. Link-Belt's Exhibit. 417

M

MacDermid, Inc., Waterbury, Conn. Metex Metal Cleaner 32
Magnetic Manufacturing Company, Milwaukee, Wis. *Magnetic Separator 125
Metal Penetrating Color Corporation, 80 West Broadway, New York City. New Finish and Rust Proofing 80
Metals Coating Company of America, 405 No. 3rd St., Philadelphia, Pa. *Schoop Process Developments 336
Middlesex Aniline Company, Lincoln, N. J. *Refined Granulated Nickel Salts 35
Milburn Company, Alexander, Baltimore, Md. New Medal Cutting Torch..... 335
Miller Company, J. C., 250-252 Pearl street, Grand Rapids, Mich. New Plating Supply House 80
Miller Industries Company, H. H., Canton, Ohio. *New Electric Furnace 32
Mitchell Engineering Company, Springfield, Ohio. *New Motor Driven Polishing Lathe 334
Modern Engineering Company, 318 Broadway, New York City. Installation and Trouble Service 416
Modern Pouring Device Company, Port Washington, Wis. *Crucible Pouring Device 502
Monarch Engineering and Manufacturing Company, Baltimore, Md. Monarch Exhibit 417
Moraine Products Company, Dayton, Ohio. Durex Bearing Material 502

N

National Engineering Company, 549 W. Washington Blvd., Chicago, Ill. National Exhibit 417
National Engineering Company, Chicago, Ill. *Sand Machine 459
Newman Manufacturing Company, Cincinnati, Ohio. Gyratory *Foundry Riddle.... 417
Newman Manufacturing Company, Cincinnati, Ohio. New Polishing or Grinding Lathes 416
Nuilite Polish Company, 248-250 Plymouth street, Brooklyn, N. Y. New Tripoli Compound 35

P

Pangborn Corporation, Hagerstown, Md. Pangborn Exhibit 373
Purity Stamping Company, Battle Creek, Mich. *Paint and Enamel Strainer 166

R

Rockwell Company, W. S., 50 Church street, New York. *Air-Tight Blast Gate..... 335
Rowe Chemical Company, 13 Newbury Road, Hale End, London, E. 4, England. New British Rust-Proofing..... 124
Ruemelin Manufacturing Company, Minneapolis, Minn. *Sand Blast Equipment... 459

S

Skeppstedt Erickson Company, Moline, Ill. *Skeppstedt Multiple Core-Making Machine, The 291
Skybryte Company, Cleveland, Ohio. *Window Cleaner 503
Stephenson, E. M., 64 Evergreen avenue, Hartford, Conn. *Spray Tank 79
Stirlen & Wallace Company, 124 Prospect street, New Haven, Conn. *The Double-Wedge Comparator 164
Stolitzka, Frank Joseph, Box 64A, East Market street, Ext., Akron, Ohio. Spun Aluminum Ball 460
Surface Combustion Company, 366 Gerard avenue, Bronx, N. Y. City. *Cleaning Parts for Plating 124

T

Timeus Otto, Inglewood, Calif. New Aluminum Alloy 165
Tucker, Alexander, Birmingham, England. New British Oxidizing Process..... 125

U

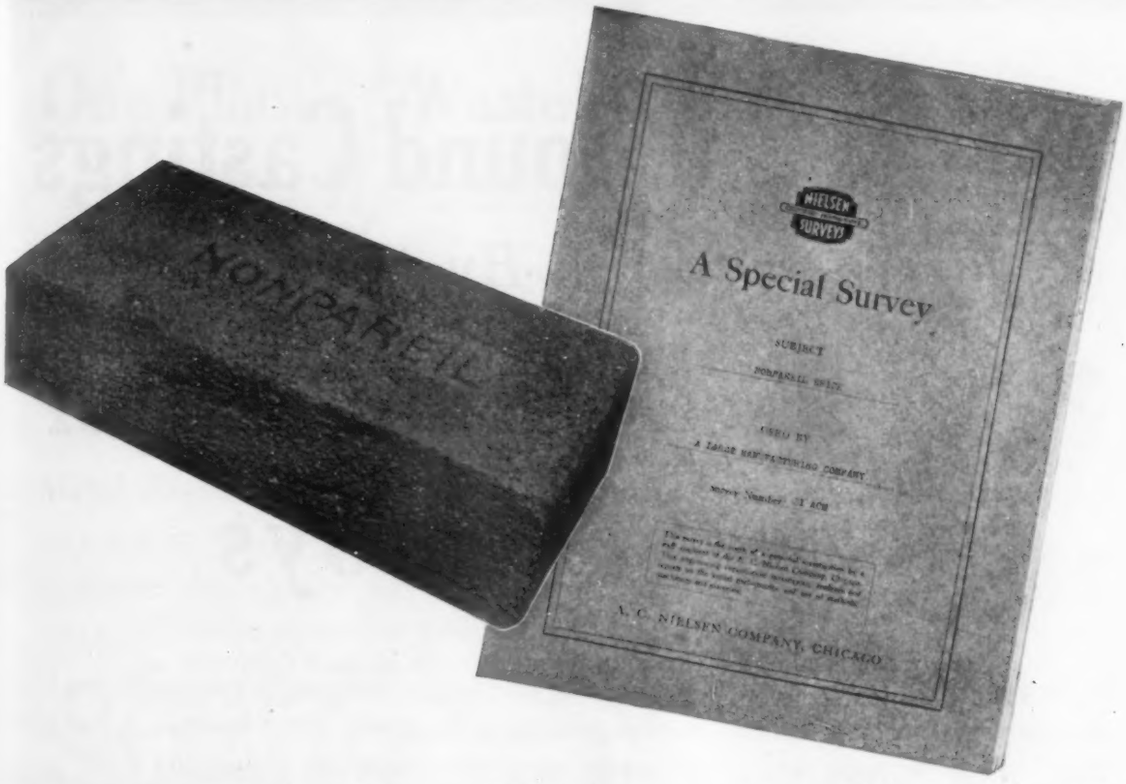
U. S. Gas Furnace Company, 46 Clifford street, Providence, R. I. *Melting Furnace for Refiners 208

V

Van Dorn Electric Tool Company, Cleveland, Ohio. *Electric Glue Pot..... 248

W

Wallace & Company, J. D., 1401-17 W. Jackson Blvd., Chicago, Ill. *Electric Solder Pot 80
Wallace Supplies Manufacturing Company, 1312 Diversey Parkway, Chicago, Ill. *Wallace Improved Combination Angle and Eye Bending Machine 373



Added Profits Through Insulation

An instance of the greater profit possibilities in heated equipment insulated with Nonpareil Brick is the case of a New York State manufacturer of gears. In an effort to reduce heat treating costs, three oil-fired furnaces were rebuilt using a 9″ course of Nonpareil Insulating Brick in walls and bottoms and a 4½″ course in the doors.

Tests were run on the furnaces by a firm of outside engineers, both before and after reconstruction, to determine the effect of the insulation on the fuel requirements. Results showed a reduction in fuel consumption of 40 gallons of oil per furnace per day, or, 72,960 gallons on the three furnaces annually, which at present fuel oil prices amounts to $4,377.60.

Reduction in fuel consumption is only one of the advantages to be gained by insulating. There are many others, all of which are explained in the 72-page book, "Nonpareil Insulating Brick." A copy and sample brick will be mailed on request.

In other words, by the simple and comparatively inexpensive process of insulating these three furnaces with Nonpareil Brick, this manufacturer is able to add $4,377.60 to the profits of his heat treating department every year.

The complete story of this remarkable saving is contained in the engineers' survey, a reprint of which we shall be glad to mail to anyone interested. Write for a copy of this report today.

ARMSTRONG CORK & INSULATION COMPANY, 116 Twenty-fourth Street, Pittsburgh, Pa.

Nonpareil Insulating Brick

For Furnaces, Ovens, etc.

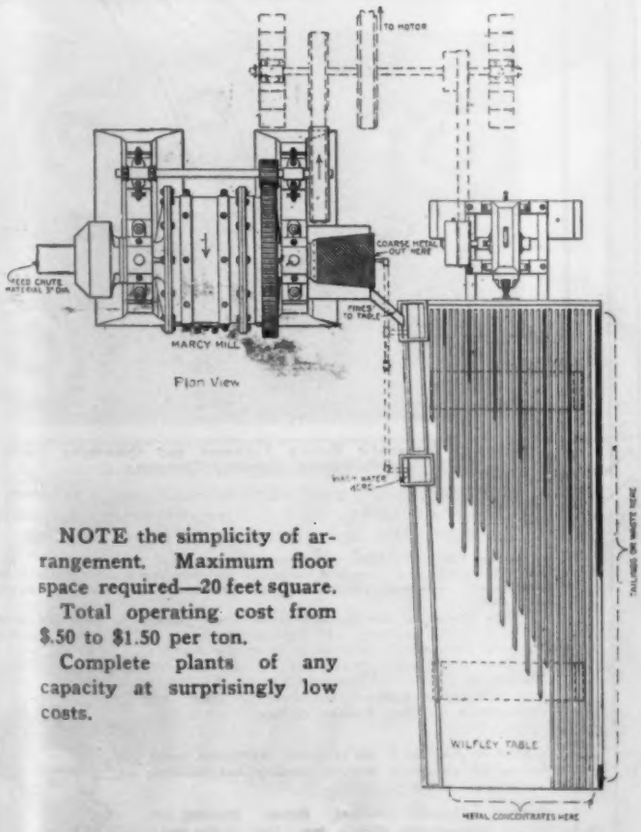
One Plant's "Waste" Is Another Plant's "Profits"

HOW big is your "scrap" pile? What do you get for it? And what do you pay for the metal when you buy it back?

It is not difficult to determine whether a MASSCO Metal Reclaiming Plant will earn profits for you. The experience of many plants proves that it will if you accumulate much scrap. Many MASSCO Metal Reclaiming installations have paid their cost in six months.

MASSCO Metal Reclaiming Plants are simple to install and easy to operate. No skilled labor required. Not to be confused with ordinary ball mills or cinder grinders.

The diagram illustrates a small size plant. The large size metallics are recovered from the mill continuously without stopping to dump it, and the table recovers the fine metallics. The equipment is built strong and heavy to last for years, and the replacement of wearing parts is negligible.



Plan View

NOTE the simplicity of arrangement. Maximum floor space required—20 feet square.

Total operating cost from $.50 to $1.50 per ton.

Complete plants of any capacity at surprisingly low costs.

A few of the many MASSCO Metal Reclaiming installations:

American Manganese Bronze Co., Holmesburg, Philadelphia, Pa.
American Tube Works, Somerville, Mass.
Bunting Brass & Bronze Co., Toledo, Ohio.
Damascus Bronze Co., Pittsburgh, Pa.
Girard Smelting & Refining Co., Philadelphia, Pa.
Kahn Bros., Brooklyn, N. Y.
Baltimore Copper Smelting & Rolling Co., Baltimore, Md.
Magnus Metal Co., Denver, Colo., Milwaukee, Wis., and Los Angeles, Cal.
Monel Metal Products Co., Bayonne, N. J.
More Jones Brass & Metal Co., St. Louis, Mo.
Wheeler Condenser & Eng. Co., Carteret, N. J.

Let us send you our booklet, "Metal Reclaiming." It is yours for the asking.

The Mine and Smelter Supply Company

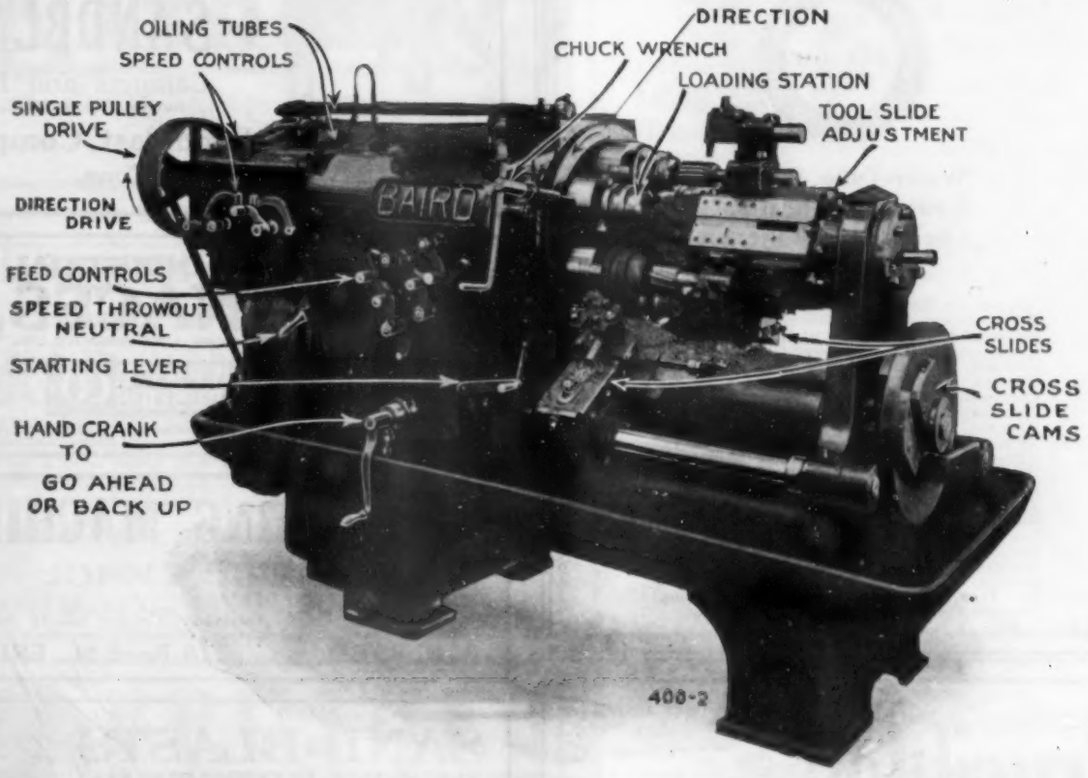
42 BROADWAY, NEW YORK

DENVER, COLO.

SALT LAKE CITY, UTAH

EL PASO, TEXAS

YOU CUT YOUR MANUFACTURING COSTS WHEN YOU "DO IT IN THE BAIRD CHUCKER"



BAIRD—6″x6″—SIX SPINDLE HORIZONTAL CHUCKING MACHINE

For performing simultaneously the operations of turning, boring, facing, drilling, reaming, threading, cross drilling, etc., on pieces as castings and forgings, up to 6″ diameter by 6″ long.

Approximate Specifications

Capacity. For work in length up to	6″
" " " " diameter up to	6″
Number of spindles	6
" " spindle feeds. (Selective)	24
Max. spindle speed, driving pulley at 800 R.P.M.	440
Min. spindle speed, driving pulley at 800 R.P.M.	28
Number of cam shaft speeds	16
Max. speed, driving pulley at 800 R.P.M. one piece in	22½ seconds
Min. speed, driving pulley at 800 R.P.M. one piece in	14 minutes
Speed of driving pulley. Average	800 R. P. M.
Dia. and Face of driving pulley	14″ x 4¼″
Horse power required	about 5
Floor space about	59″ x 96″
Net weight about	9300 lbs.

Single pulley drive.
Can be supplied with direct motor drive.
Five working and one loading spindle.
Five longitudinal tool slides.
Five tool stations.

Patented

A range of spindle speeds from one piece in about 22½ seconds to one piece in about 14 minutes at pulley speed of 800 R.P.M.

Instant change gears for all spindle and feed speeds.

A correct speed for each operation.

A correct feed for each operation.

No lost time for chucking.

Forced feed circulating lubrication.

All gears—except drum gear—of nickel steel, hardened and running in bath of oil.

Tank and pump for cutting lubricant.

High speed motion to tool return.

Work being done on five pieces while the operator is removing finished piece and reloading the chuck.

One operator can attend several machines.

Machine provided with automatic stop.

Range of spindle speeds, selective from 28 to 440 R.P.M. inclusive, with driving pulley running at 800 R.P.M.

Submit your samples or drawings of your work for consideration and estimate.

More detail is given in BAIRD Bulletin No. 400 which will be gladly sent on request.

THE BAIRD MACHINE CO., BRIDGEPORT, CONN., U.S.A.

Here's How We Can Cut Our Cleaning Costs

The cost of the metal cleaning operation can be reduced by using physical as well as chemical action—ESCO cleaner supplies both.

Its attack upon dirt, grease and oil is twofold so that the cleaning is done thoroughly—quickly—economically, and your costs go down.

When dissolved Esco breaks up into millions of minute particles, colloids, which whirl about ceaselessly and are relentless in their assault upon the undesirable foreign substances, dissolving them so that they are easily washed away.

The controlled alkali in Esco provides its additional chemical action. The concentration for active cleansing duty is exceedingly high, but the colloidal state of the Esco solution controls the alkali so that it is harmless to hands and clothing.

As its physical-chemical attack speeds up the washing and eliminates the necessity of scouring, Esco saves time and labor and lowers production costs.

Send for the special booklet "How Science Speeds Up Metal Cleaning" that will tell you in dollars and cents what Esco will do for you. Use the coupon today.

THE OWLES DETERGENT CO.

558 W. Jackson St. Lockport, N. Y.

Please send me Free Copy of HOW SCIENCE SPEEDS UP METAL CLEANING without obligation to me.

Name .....

Address .....

City ..... State .....

ESCO CLEANER

O.P.C. gives perfect results after other cleaners fail ~

Steel timer shells cleaned in 15 seconds

THIS plating room couldn't get good results with the cleaner they had been using. The slightly higher cost per pound of Oakite Platers' Cleaner made them hesitate about using it. After O.P.C. was demonstrated however, and they discovered how they could clean a batch of work in one minute and get perfect results, they soon realized that O.P.C. was the most economical cleaner to use in the long run.

The job is to remove stamping oil and shop dirt from stamped steel timer shells for automobiles. One cleaner after another was tried out without success until they began using O.P.C. The Oakite Company Specialist continued to work with the Plating Foreman until the actual immersion in O.P.C. solution was reduced to 15 seconds, thus speeding up the job and making it possible to put through more parts with the same equipment.

If you are having trouble of any kind on your plating job—put it up to an Oakite Cleaning Specialist. Don't figure you can't afford to use O.P.C. The chances are you can't afford not to use it. You will find, as others have, that O.P.C. *costs less to use*—and you get the kind of results you want.

"This Advertisement is one of a series based on actual occurrences."

Just tell us you are interested. We will have an Oakite man call quickly. There's no obligation.

There are 70 Oakite Service Men, cleaning specialists, located at:—

Allentown, Pa., *Atlanta, Ga., Baltimore, Boston, Bridgeport, *Brooklyn, Buffalo, Camden, Canton, O., Charlotte, N. C., *Chicago, *Cincinnati, *Cleveland, *Dallas, *Davenport, Dayton, *Denver, *Des Moines, *Detroit, Erie, Flint, Mich., Grand Rapids, Harrisburg, Hartford, *Indianapolis, *Kansas City, *Los Angeles, *Milwaukee, *Minneapolis, *Montreal, Newark, New Haven, *New York, *Oakland, Calif., Peoria, Philadelphia, Pittsburgh, Portland, Me., Poughkeepsie, Providence, Reading, Rochester, Rockford, Rock Island, *San Francisco, Schenectady, *Seattle, *St. Louis, Syracuse, Toledo, *Toronto, Utica, *Vancouver, B. C., Waterloo, Ia., Williamsport, Pa., Worcester.

*Stocks of Oakite Materials are carried in these cities

Oakley Chemical Co. *General Offices:* **18 Thames St., New York, N. Y.**

OAKITE

Trade Mark Reg. U. S. Pat. Off.

Industrial Cleaning Materials

CROWN BALL BEARING LATHES

MADE IN THREE SIZES

Crown ball bearing lathes have been designed to meet the requirements of the polishing room, keeping in mind the saving of power, low maintenance cost, and convenience to the workman. Note the many new features not found on other lathes. We are now making three sizes, No. 36, 38, and 40, with spindles 44", 48", and 52" long respectively.

FRONT VIEW

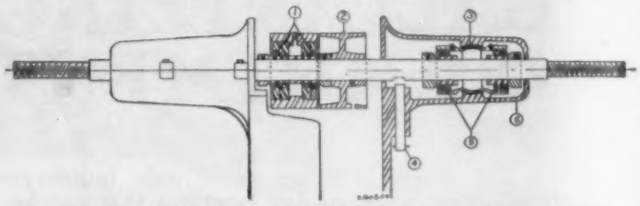
Note The Spindle Lock

Ball Bearing Loose Pulley

Double Self Aligning Bearings

Clean Out In Rear

Three Sizes



SECTIONAL VIEW LATHES NOS. 38 AND 40

1—Ball bearing loose pulley.
3—Self-aligning dust proof double bearing at each end, completely enclosed for further protection.
4—Shaft lock for changing wheels.
5—The Double ball bearings unusually large and close to wheels add to rigidity of shaft.

SPECIFICATIONS IN BRIEF

Spindles are of ground steel shafting of large size and have square threads that will stand abuse.

Bearings—The number 38 and 40 lathes have two double self-aligning S. K. F. dust proof ball bearings located as close to the wheels as is practical. The number 36 has two single self-aligning ball bearings. These ball bearings require only occasional oiling.

The Frame—Rigid one piece frame so designed that the lathe may be belted from overhead, below or rear. Has clean out door in rear.

Pulleys—When loose pulleys are specified they are equipped with two sets of ball bearings. Tight pulleys are locked to spindle with three set screws.

MAXIMUS MOTOR GENERATOR SETS

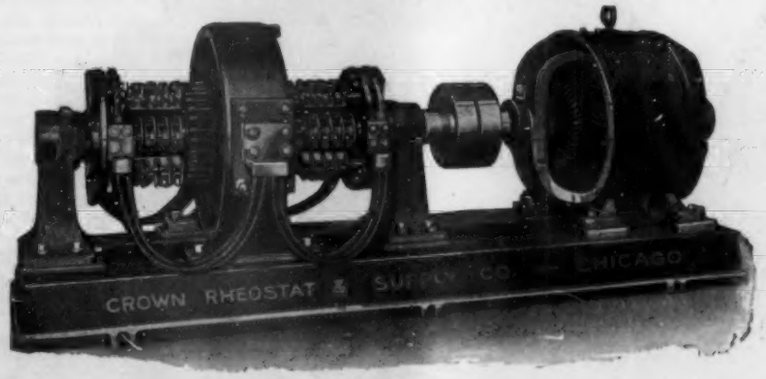
The finest in mechanical and electrical design

Bar Wound Armatures

Composition Brushes

Self Adjusting Holders

Perfect Commutation Without Inter-poles



Steel Frames

Laminated Poles

Thorough Ventilation

Highest Efficiency

No Sparking

MADE IN SIZES 50 TO 7500 AMPERE

Maximus dynamos are the result of years of study and research of electrical and mechanical engineers; they embody all of the best features developed to date. They hold their voltage from no-load to full load and commutate perfectly without any loss-producing corrective devices such as the interpole. They were designed right. The result is highest efficiency and satisfied users.

WE SUPPLY EVERYTHING FOR POLISHING AND PLATING

Crown Rheostat & Supply Company

1910 Park Avenue, West **CHICAGO, ILLINOIS**

"ACME"

GEORGE ZUCKER CO.
ORGANIZED 1883

Do You Select Tripoli To Minimize Buff Wear?

Sprinkle some abrasive on a polished desk top and rub it with a piece of writing paper. You will scratch the surface of the desk but you will also cut the paper. A similar action takes place when tripoli composition having an incorrect binder is used on a buff. The tripoli cuts not only the metal but the buff as well and thus causes abnormal buff wear.

If you glue the abrasive firmly to the paper you can scratch the surface of the desk without destroying the paper. The purpose of the grease binder in tripoli is comparable to the glue, except that the binder should hold the tripoli on the buff face *only as long as it retains its cutting qualities.* Don't you appreciate then, the importance of selecting a tripoli with the right binder—one that is exactly suited to the peripheral speed of the buff, the pressure applied and the character of the work being done in addition to holding the tripoli on the buff only as long as it is capable of performing useful work. Good buffs cost from seven to ten times as much per pound as tripoli, and a tripoli which causes excessive buff wear, no matter how little it costs, is poor economy.

Selecting the correct grease binder is just one of the many things Munning engineers have learned about buffing compounds by experiment and from the experience of competent buffers, and it is one of the reasons why Acme Brand Tripoli is so carefully graded and why one grade is recommended in preference to another for a particular piece of work. There are 16 standard grades of Acme Brand Tripoli Composition, each one of which is particularly suited for a definite buff speed, pressure applied and character of work to be buffed. Tell us the kind of work you are doing and we will gladly recommend the grade of Acme Brand Tripoli that will give the best results.

A. P. MUNNING & CO.

Manufacturers of Electro-Plating and Buffing Apparatus and Supplies for All Industries

Factories: MATAWAN, N. J. AND CHICAGO

Sales Offices:

NEW YORK.....52 Vesey St.
CHICAGO .....2920 Carroll Ave.
DETROIT.....718 Free Press Building
PHILADELPHIA .....Bourse Building
CLEVELAND, OHIO.....1604 E. 73rd St.
SPRINGFIELD, MASS.43 Ft. Pleasant Ave.
SYRACUSE, N. Y..306 City Bank Building
MILWAUKEE.....1413 Majestic Bldg.

Agencies:

Cutter & Wood Supply Co....Boston, Mass.
Geo. L. Claflin Co.,
Providence, R. I., and Attleboro, Mass.
Industrial Supply Co., Inc.New Haven, Conn.
E. A. Kinsey Co.....Cincinnati, Ohio
Frost-Naus Company....Minneapolis, Minn.
G. S. Robins & Co.....St. Louis, Mo.
F. B. Stallman Supply Co....San Francisco
J. C. Miller & Co.....Grand Rapids

A NEW MOTOR DRIVEN POLISHING LATHE

Front View of Lathe

All alternating current motors operate at fixed and unalterable speeds which generally are not the most efficient for polishing and buffing operations. The speeds obtainable with the usual frequencies are 1400, 1800 and 3600 R.P.M. which are too slow or too fast in nearly every case.

ANY SPINDLE SPEED OBTAINABLE

With this machine any desired spindle or wheel speed may be obtained with any frequency alternating current motor by means of changing the ratio of motor and spindle pulleys. The machine illustrated is provided with a 60 cycle motor with a speed of 1800 R.P.M. —the motor pulley is 8″ diam. and the spindle pulley is 6″ diam. giving a spindle or wheel speed of approximately 2300 R.P.M.

STANDARD MITCHELL LATHE CONSTRUCTION

The lathe proper is the standard type of Mitchell Lathe construction, using a double bearing housing of the ball and socket type for supporting each end of the spindle, insuring an equal distribution of the load on all four bearings.

BALL BEARING TOTALLY ENCLOSED MOTOR

This machine is furnished with a ball bearing fully enclosed self-ventilating motor, either 60, 50, 40 or 25 cycles. It is completely enclosed and gives positive protection of the motor against dust, gas, oil or water. Clean cool air is supplied to the motor through the "Y" inlet at the top of the motor. The suction fans, one on each end of rotor, give enough suction to draw the air for a distance of 75 feet, insuring a clean cool motor at all times.

QUICK BELT ADJUSTMENT

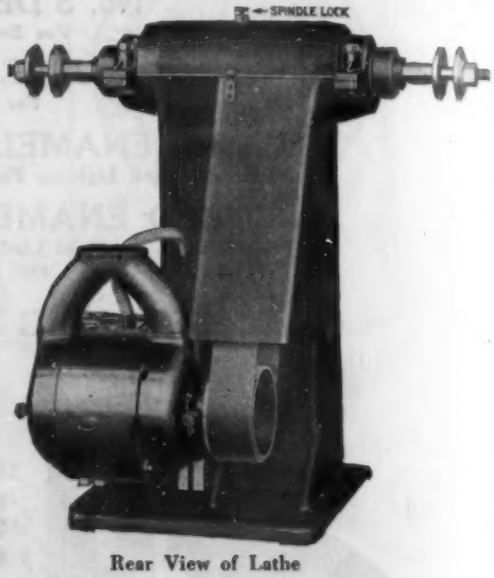
The adjustable base of the motor is bolted to the frame of the Lathe in a vertical position so that the motor can be lowered to keep the belt perfectly taut.

SPINDLE LOCKING DEVICE

The belt is carefully guarded as indicated by cut. The pulley cover is hinged and is provided with a locking pin to hold spindle from rotating while changing wheels.

PUSH BUTTON CONTROL

The machine is provided with a magnetic starting switch with Push Button Control. It is all complete ready to attach to line wires. Sizes 3, 5 and 7½ H.P.



Rear View of Lathe

Sole Distributors

FREDERIC B. STEVENS, INC.

Manufacturers of Foundry, Electro-Plating and Polishing Supplies and Equipment
Cupola Blocks, Fire Brick and Clay
Corner of Third and Larned Streets
DETROIT, MICH.

INDIANA BRANCH:
Hoosier Supply Co.,
188 South Delaware Street,
Indianapolis, Ind.

NEW ENGLAND BRANCH:
Frederic B. Stevens, Inc.,
51 Chestnut Street,
New Haven, Conn.
Edward R. Sutton, Mgr.

PENNSYLVANIA BRANCH:
Frederic B. Stevens, Inc.,
230 West 12th Street, Erie, Pa.
Charles J. Manzemer, Mgr.

CANADIAN BRANCH:
Frederic B. Stevens, Inc.,
926 McDougall St.,
Windsor, Ont.
Harry Hind, Mgr.

DIRECTORY

Copper, Brass and Other Metal Rolling Mills

MANUFACTURERS OF PLATE, SHEET, ROD, WIRE, TUBE, INGOT, METAL GOODS

DIRECTORY

Copper, Brass and Other Metal Rolling Mills

MANUFACTURERS OF PLATE, SHEET, ROD, WIRE, TUBE, INGOT, METAL GOODS

Lead and Zinc Smelters and Manufacturers

PRODUCERS OF PIG LEAD, SLAB ZINC, ZINC ROD, SHEET ZINC, ACIDS

DIRECTORY

Metal Smelters, Refiners, Dealers

PRODUCERS, ALSO BUYERS AND SELLERS OF NEW AND OLD METALS

Nassau Smelting & Refining Works
607 West 29th St., New York
COPPER, SLAB ZINC, LEAD, TIN, ALUMINUM, NICKEL, ANTIMONY
Red and Yellow Composition Manganese-Bronze
Ingot Phosphor-Bronze
BABBITT and TYPE METALS, SOLDERS
PURCHASERS AND REFINERS OF
TIN DROSSES, SCRUFF, MATTE, LEAD and TYPE DROSSES, METALLIC OXIDE, RESIDUES
AND ALL COPPER BEARING MATERIALS

BALBACH SMELTING & REFINING CO.
Works Newark, N. J. Offices { Newark, N. J. / 280 Broadway, New York
BALBACH METALS CORPORATION
280 Broadway New York, N. Y.
Purchasers of
COPPER BEARING MATERIAL
A superior market offered for all kinds of Residue and Scrap Materials containing copper in any form
LEAD BEARING MATERIAL
Battery Plates, Sediment, Sulphates, Drosses, etc.

CAPPER PASS & SON, LTD.
BEDMINSTER SMELTING WORKS
BRISTOL, ENGLAND
Cable Address—Pass, Bristol
Are Buyers of
Ore, Mattes, Drosses or Residues
Containing Tin, Copper, Lead and Antimony
Send samples for analysis

COMPOSITION INGOT BRASS
W-C BRAND
Manganese Bronze Ingot
High quality metal made under strict chemical control to your specifications.
Send us your inquiries
THE WHIPPLE & CHOATE CO.
BRIDGEPORT, CONN.

Established 1789
NATHAN TROTTER & CO.
Pig Tin, Pig Lead, Slab Zinc
Ingot Aluminum
Ingot Copper, Shot Nickel, Antimony
36 No. Front St.
PHILADELPHIA, PA.

FERRO MANGANESE
"CARLTON" Brand—Direct from Makers
We also solicit your orders for
Aluminum—Antimony—Magnesium and other Metals.
C. W. LEAVITT & CO.
30 Church St. *Telephone Cort. 4752* New York

RARE METALS AND MINERALS BOUGHT AND SOLD FOR CASH
Platinum, Osmiridium, Paladium, Silver, Quicksilver, Amalgams, Bismuth, Cadmium, Magnesium, Tungsten, Molybdenum, Silicon, Galena, Pyrite, Etc.
JOSEPH RADNAI
36 FULTON ST. NEW YORK

ESTABLISHED 1896 Phone GLENMORE 4400
Belmont Smelting and Refining Works, Inc.
THE QUALITY HOUSE
Gen. Offices: 332 BELMONT AVE., BROOKLYN, N. Y.
(Plant Covers 31 City Lots)
Manufacturers of "BELMONT" BRAND
GUARANTEED INGOT BRASS (Red and Yellow)
PURE AND No. 12 INGOT ALUMINUM
Dealers in VIRGIN METALS AND SCRAP METALS

DIRECTORY

Contract Workers

CASTING, SPINNING, DESIGNING, MOULDMAKING, SPECIALTIES, ETC.

Egg Slicer, made of aluminum, with fine steel wires, that slice uniformly by one operation.

Manufactured by
EMIL RICHTER
Factory of Aluminum Ware.
Crottendorf, Erzgeb., Germany

MOULD MAKING of Every Description
Designing and Modeling.
JULIUS FELEK
Tel. Canal 2333 61 GRAND ST., NEW YORK CITY

IT WILL PAY YOU TO ADVERTISE YOUR PRODUCT IN THE METAL INDUSTRY

DIRECTORY

Contract Workers

CASTING, SPINNING, DESIGNING, MOULDMAKING, SPECIALTIES, ETC.

Professional

BUSINESS WANTS

FOR SALE—EQUIPMENT, ETC.

Display Advertisements, One Column Wide, $3 per inch, Each Insertion.

Electro Galvanizing Outfit
FOR SALE

The following electro galvanizing outfit, on hand in Plant, Central Ohio, material practically new, used two or three times, make best offer:

1—3000 ampere motor generator set, direct connected to 30 H. P., 220 volt, 60 cycle, 3 phase induction motor.

2—Galvanizing tanks, each 21′ x 40″ x 36″.

3000 gal. of Meaker Sustaining Galvanizing Solution.

1—Water Storage Tank, 13′ x 24″ x 18″.

150—Cast Zinc Anodes, copper hook cast in one end of each.

10—Anode and Cathode Copper Rods, 1″ dia. x 22′ long.

2—Ammeters, each calibrated from 0 to 2000 amperes, Weston make, model No. 271.

1—Voltmeter, calibrated from 0 to 10 volts, Weston make, model No. 271.

1—Motor Generator Exciter Set.

1—Hot Water Rinse Tank, 13′ long, 36″ deep, 18″ wide, 2″ tank grade lumber.

1—Pickle Tank 13′ long, 18″ wide, 18″ deep, made of 3″ fir tank grade lumber.

Electro Galvanizing
Care The Metal Industry

Polishing and Plating Equipment

Plating Dynamos and Motor Generator Sets

All sizes carried in stock.

Tumbling and Plating Barrels

Anodes	Wheels and Buffs	Steam Boilers	Kane and Ofeldt
Spraying Systems	Ammeters		
Polishing Lathes	Rheostats	Gas Fired	
Plating Tanks	Voltmeters	Blower Systems	

And most anything for the Plating Shop.

J. HOLLAND & SONS,
489 Broadway, Brooklyn, N. Y.
Telephone Stagg 5128

Largest Stock of Used Polishing and Plating Supplies in America

Let us have your requirements. Entire plants or parts thereof bought for cash. Send list with prices.

Plating Dynamo

FOR SALE—ONE Hanson Van Winkle 4000 Ampere Double Commutator.

HARRY JAWITZ,
807 Freeman Street, Bronx, New York City.

Generator

FOR SALE—No. 6 N. S. Hanson and Van Winkle Generator, New, 10 Volts, 400 Amperes, 1300 RPM.

MECKLENBURG IRON WORKS,
Charlotte, N. C.

Have you a copy of the Orange Book No. 28?

Prices quoted in the Orange Book, on plating generators, motors, transformers, control equipment, etc., will prove that you can save money by purchasing guaranteed rebuilt equipment. Immediate shipment from a stock of over 8000 units. Write for your copy now.

The FUERST-FRIEDMAN CO., Cleveland, Ohio

WANTED—EQUIPMENT, ETC.

Display Advertisements, One Column Wide, $3 per inch, Each Insertion

Spinning Lathe

WANTED—Metal Spinning Lathe, 22-inch swing or 36-inch swing. Must be a Fryibil thrust back. Please state best price for cash.

JOHN COOK & CO.,
1717 Gent Avenue, Indianapolis, Ind.

AGENCY

COPPER EXPORTER—Also tin and other metals. Excellently connected firm open to accept agency of first rate sellers for Czechoslovakia, Austria and other states mid-Europe.

RUDOLPH TURK,
3 Soukenicka, Prague.

MACHINERY

WANTED—Convert your idle machinery into cash. We buy all kinds of metal working machinery, electrical apparatus and leather belting.

FREIDUS MACHINERY CO.,
174 Centre Street, New York City.

Metals—Chemicals

WANTED—We buy for spot cash surplus and odd lots of minerals, ores, metals, oils, chemicals, solvents and any item of a chemical nature.

REPUBLIC CHEMICAL COMPANY,
303 Pearl St., New York City.

Advertise your products in THE METAL INDUSTRY

BUSINESS WANTS—Continued

INQUIRIES AND OPPORTUNITIES

For further particulars address THE METAL INDUSTRY, 99 John Street, New York City.

Inquiry 3269.—We are interested in equipment for drying or baking paint or enamel.

Inquiry 3270.—We wish to know if there is any silver and nickel lacquer.

Inquiry 3271.—Please advise who manufactures "Kruick Kutter Tripoli."

Inquiry 3272.—Kindly refer us to manufacturers of electric furnaces particulary suitable for melting brass.

Inquiry 3273.—Can you inform me of firms who specialize on the making of rollers for rolling mills for the manufacture of silver and copper sheets?

Inquiry 3274.—I would like to know of a foundry that makes Duralumin and could furnish me with some rolled hoops or bands in sizes that will measure 36 inches in diameter and 1 inch thick by 6 inches wide.

Inquiry 3275.—Will you advise name and address of builders of Automatic Polishing Machines for flat surfaces?

SITUATIONS OPEN

Display Advertisements, One Column Wide, $3 Per Inch, Each Insertion.

SALESMAN

WANTED: An experienced Foundry Supply Salesman: one with actual foundry practice preferred; to introduce two special foundry products. Permanent position; good oportunity for future. Address

FOUNDRY SALESMAN.
Care of THE METAL INDUSTRY.

SALESMAN

SITUATION OPEN—Exceptional opportunity open for high grade traveling salesman as engineering and sales representative for most improved automatic electro galvanizing plating, cleaning and allied equipment and supplies. Knowledge of the plating industry essential. Reply by letter for interview, giving age, experience, etc. Confidential. Address:

SALES,
U. S. GALVANIZING & PLATING EQUIPMENT CORP.,
32 Stockton Street, Brooklyn, N. Y.

Opportunity for Man Experienced in the Plating and Metal Finishing Field

An opportunity is presented for a man experienced in the metal finishing field to work as a traveling Service Representative for the most improved automatic electro-galvanizing, plating, cleaning and allied equipment and supplies. Such a man is probably employed at present as foreman of a plating room or superintendent of a metal finishing department. Apply by letter for interview, giving age, experience, etc. Confidential. Address:

SERVICE REPRESENTATIVE,
Care of THE METAL INDUSTRY.

REPRESENTATIVE

WANTED—To get in touch with someone going to England soon that they may attend to some affairs for us among our customers there. Write WILFRED S. McKEON, Pres.,

"Liquid Sulphur"
Greensberg, Pa.

Salesman Wanted

SITUATION OPEN—Salesmen calling on users of Acid Vats and Platers' Tanks can greatly increase your income by handling a product for which there is a big demand. Samples, prices and commission quotes on request. Act quickly. Write or wire,

CALLENDER & CO.,
12 South Jefferson St., Chicago, Ill.

Manager Executive

SITUATION OPEN—Opportunity offered to a capable man in large growing Brass Foundry, manufacturing staple line of brass goods. Investment of $5,000.00 and services required. Reply, giving age, experience and references. Address:

BRASS GOODS,
Care of THE METAL INDUSTRY.

Brass Room Foreman

SITUATION OPEN—A No. 1 Brass Assembly Room Foreman for manufacturer of Plumbers' Brass goods. State experience, reference, age and salary. Reply in confidence.

PLUMBERS' BRASS,
Care of THE METAL INDUSTRY.

Machine Shop Foreman

SITUATION OPEN—A No. 1 Brass Machine Shop Foreman, one able to superintend the manufacture of complete line of plumbing fixtures, handle men so as to get production. State age, reference and salary. Reply in confidence.

SHOP FOREMAN,
Care of THE METAL INDUSTRY.

WANTED

Copies of Electro-Plating by Barclay and Hainsworth.

THE METAL INDUSTRY
99 John Street,
New York

Your Advertisement Here Would Be Seen by Thousands of Readers

BUSINESS WANTS—Continued

SITUATIONS WANTED

Display Advertisements, One Column Wide, $1.00 per Inch, Each Insertion.

Foundry Superintendent

SITUATION WANTED—Brass and Aluminum Foundry Superintendent thoroughly experienced in all branches. Was expert for large company, called to various plants to straighten out trouble and increase production. Will start at moderate salary and depend on ability to earn increase.

ALUMINUM FOUNDRY,
Care of THE METAL INDUSTRY.

Superintendent or Manager

SITUATION WANTED—As Superintendent or Manager, by experienced executive, thoroughly familiar with up-to-date methods in the manufacture of Brass Steam goods and plumbers' supplies. Capable of developing ideas from the crudest thought or sketch through all stages of experimenting, patterns, tools, cost estimating, etc., to the highest production plane. Address:

ABILITY, Care of THE METAL INDUSTRY.

Casting Foreman

SITUATION WANTED—A copper casting building foreman with 17 years' practical experience at both ends, wire bar and anode furnaces. At present employed, desires a change.

A. A.,
Care of THE METAL INDUSTRY.

Foreman Plater

SITUATION WANTED—By a foreman plater who has had many years' experience, will guarantee high grade plating and large production.

DECEMBER 1,
Care of THE METAL INDUSTRY.

PLATER

SITUATION WANTED—Plater, first class on all solutions make or correct, install plant. Silver, lighting fixtures, die castings, aluminum musical instruments. Capable foreman; A-1 references.

ALL SOLUTIONS,
Care of THE METAL INDUSTRY.

Buffing Composition

SITUATION WANTED—Production Manager wants position. Can make more efficient goods than most men in the line.

COMPOSITION,
Care of THE METAL INDUSTRY.

Buyer

SITUATION WANTED—Buyer of copper bearing material, ores and residues, acquainted with the eastern trade, also experienced in marketing copper and brass products, copper and composition ingots, in U. S. and Europe. Willing to establish connection in Europe.

BUYER,
Care of THE METAL INDUSTRY.

Polishing Expert

WANTED—To get in touch with a business man or concern interested in the best invention ever patented in the field of metal polishing. A Self Feeding Buffing Wheel which will monopolize the buffing wheel industry. Cash and royalty or partners to finance the manufacturing.

POLISHING EXPERT,
Care of THE METAL INDUSTRY.

BOUND VOLUMES

Wanted—Bound or Unbound Volumes of The Metal Industry for the years 1903-1909 inclusive.

THE METAL INDUSTRY
99 John Street New York

Metallurgist

SITUATION WANTED—Metallurgist of many years' experience with all kinds of metal plants desires a position. Address:

EXPERIENCED METALLURGIST,
Care THE METAL INDUSTRY.

Superintendent—Foreman

SITUATION WANTED—Expert on all classes of gray iron. Familiar with machines, strictly temperate. What have you to offer? References. Address:

HILLSIDE,
Care of THE METAL INDUSTRY.

Brass Foundry Foreman

SITUATION WANTED—As Brass Foundry Foreman. Understands mixing of metals and molding machines. Ten years' experience on plumber's brass and match plate work. Can accept position on short notice. Address:

MOLDING MACHINES,
Care THE METAL INDUSTRY.

Electro Platers

Anyone desiring the services of first class men for the electro deposition of metals and finishing in all branches and departments of the plating business can secure such services by corresponding with the Secretary of the American Electro Platers' Society.

E. J. MUSICK,
7144 Kingsbury Blvd., St. Louis, Mo.

Foreman Plater

SITUATION WANTED—An A-1 Plater with many years of experience and good references is anxious to secure a position. Address

P. H.,
Care of THE METAL INDUSTRY.

Silver Expert

SITUATION WANTED—Silverware man open for position January 1st, 1925. Practical and executive experience, up-to-date cost methods covering Flat and Holloware. Best of references. Address:

SILVER EXPERT,
Care of THE METAL INDUSTRY.

ETCHER

SITUATION WANTED—With reliable concern, by practical etcher of twenty-five years' experience, one who has a thorough working knowledge in the etching of various metals. Can instruct in all commercial branches.

JOHN R. BAYNES,
138 Washington Street, Norwich, Conn.

Electro Plating and Electro-forming

by

Blum and Hogaboom

Price $4.00

Payable in Advance.

THE METAL INDUSTRY
99 John Street New York

BUYERS' GUIDE: ADVERTISERS' PRODUCTS

ABRASIVES (Also see Emery.)

Artificial

Abrasive Company, Bridesburg, Philadelphia, Pa.
General Abrasive Co., Niagara Falls, N. Y.
Stevens, Frederic B., Detroit, Mich.

ACCUMULATORS, HYDRAULIC (Also see Hydraulic Machinery.)

Watson-Stillman Co., New York.

ACID-PROOF CEMENT

ACID PUMPS, STONEWARE

General Ceramics Co., New York.

ACIDS

Hydrofluoric

General Chemical Co., Philadelphia, Pa.

Oil of Vitriol (Sulphuric)

Hegeler Zinc Co., Danville, Ill.
New Jersey Zinc Sales Co., New York.

AEROPLANE DOPE

Egyptian Lacquer Mfg. Co., New York.
Nikolas, G. J., Co., Chicago, Ill.

AGITATORS FOR PLATING SOLUTIONS

Rausch Mfg. Co., Racine, Wis.

AIR BRUSHES AND ACCESSORIES (See Sprayers; Spraying Accessories.)

AIR COMPRESSORS

DeVilbiss Mfg. Co., Toledo, O.
Eureka Pneumatic Spray Co., Richmond Hill, N. Y.
Ideal Air Brush Mfg. Co., New York.
Nikolas, G. J., Co., Chicago, Ill.

AIR FILTERS

DeVilbiss Mfg. Co., Toledo, Ohio.
Eureka Pneumatic Spray Co., Richmond Hill, N. Y.
Nikolas, G. J., Co., Chicago, Ill.

AIR TANKS

Koven, L. O., & Bro., Jersey City, N. J.
Nikolas, G. J., Co., Chicago, Ill.

ALCOHOL, BUTYL

Commercial Solvents Corp., Terre Haute, Ind.

ALLOYS (See also Kind Wanted.)

Non-Ferrous

American Brass Co., Waterbury, Conn.

Brass, Bronze, Nickel Silver

American Brass Co., Waterbury, Conn.

ALUMINUM (See Ingots, Sheet, Wire, Rod etc.)

ALUMINUM ALLOYS

American Boron Products Co., Reading, Pa.

AMMETERS (See also Electrical Apparatus and Equipment.)

Connecticut Dynamo & Motor Co., Irvington, N. J.
Crown Rheostat & Supply Co., Chicago, Ill.
Winkle Co., Newark, N. J.

AMMONIUM CHLORIDE (Sal Ammoniac.)

Roessler & Hasslacher Chemical Co., New York.

AMYL ACETATE

Egyptian Lacquer Mfg. Co., New York.
Nikolas, G. J., Co., Chicago, Ill.

ANNEALING FURNACES

Electric

Detroit Electric Furnace Co., Detroit, Mich.
Rockwell, W. S., Company, New York.

Oil or Gas

Kenworthy, Chas. F., Waterbury, Conn.
Mine & Smelter Supply Co., New York.
Monarch Engineering & Mfg. Co., Baltimore, Md.
Rockwell, W. S., Company, New York.
Surface Combustion Co., New York.

ANODES

Brass and Bronze

Harshaw, Fuller & Goodwin Co., Cleveland, O.
Lasalco, Inc., St. Louis, Mo.
MacDermid Incorporated, Waterbury, Conn.
Munning, A. P., & Co., New York-Chicago.
Seymour Mfg. Co., Seymour, Conn.
Stevens, Frederic B., Detroit, Mich.
U. S. Galvanizing & Plating Equipment Corp. Brooklyn, N. Y.

Copper

Harshaw, Fuller & Goodwin Co., Cleveland, O.
Hussey, C. G., & Co., Pittsburgh, Pa.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill
MacDermid Incorporated, Waterbury, Conn.
Munning, A. P., & Co., New York-Chicago.
Seymour Mfg. Co., Seymour, Conn.
Stevens, F. B., Detroit, Mich.
U. S. Galvanizing & Plating Equipment Corp., Brooklyn, N. Y.

Gold

Handy & Harman, New York.

Nickel

Crown Rheostat & Supply Co., Chicago, Ill.
Daniels & Orben Co., Inc., New York.
Ely Anode & Supply Co., New York.
Harshaw, Fuller & Goodwin Co., Cleveland, O.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.
MacDermid Incorporated, Waterbury, Conn.
Munning, A. P., & Co., New York-Chicago.
Seymour Mfg. Co., Seymour, Conn.
U. S. Galvanizing & Plating Equipment Corp., Brooklyn, N. Y.

Platinum

Handy & Harman, New York.
Roessler & Hasslacher Chemical Co., New York.

Silver

Handy & Harman, New York.
Jackson, John J., Co., Newark, N. J.

Zinc

Harshaw, Fuller & Goodwin Co., Cleveland, O.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.
Meaker Galvanizing Co., Chicago, Ill.
Munning, A. P., & Co., New York-Chicago.
New Jersey Zinc Sales Co., New York.

ANTI-FRICTION METAL (See also Babbitt Metal and Bearings.)

Ajax Metal Company, Philadelphia, Pa.

ANTIMONY METAL

Leavitt, C. W., & Co., New York.

ASSAY CRUCIBLES, Sand

Joseph Dixon Crucible Company, Jersey City, N. J.

ASSAYERS AND CHEMISTS (See also Testing Laboratories.)

Pitkin, Lucius, Inc., New York.

AUTOMATIC MACHINERY (See Kind Wanted.)

AUTOMATIC POLISHING MACHINES

Acme Mfg. Co., Detroit, Mich.

AUTOMATIC WIRE AND SHEET METAL WORKING MACHINERY

Baird Machine Co., Bridgeport, Conn.

AUTOMOBILE FORGINGS

Scovill Mfg. Co., Waterbury, Conn.

BABBITT METAL (See also Bearings.)

Ajax Metal Co., Philadelphia, Pa.
Electric Smelting & Aluminum Co., Lockport, N. Y.
Michigan Smelting & Refining Co., Detroit, Mich.
Niagara Falls Smelting & Refining Corp., Buffalo, N. Y.

BABBITT MOLDS (See Molds.)

BALANCES

Mine & Smelter Supply Co., New York.

BALL BURNISHING EQUIPMENT (Also see Burnishing and Polishing Barrels.)

Abbett Ball Co., Hartford, Conn.
Baird Machine Co., Bridgeport, Conn.
Globe Machine & Stamping Co., Cleveland, Ohio.
Winkle Co., Newark, N. J.
No-Dust Drying Machine Co., Waterbury (Waterville Station), Conn.

BALLS, STEEL (See Steel Balls.)

BARS; SILVER, GOLD, PLATINUM

Handy & Harman, New York.

BEARINGS (Also see Babbitt Metal and Anti-Friction Metal.)

Babbitt

Ajax Metal Co., Philadelphia, Pa.

BLAST GATES

Grand Rapids Blow Pipe & Dust Arrester Co., Grand Rapids, Mich.
Rockwell, W. S., Co., New York.

BLOWERS AND BLOW PIPING (See also Exhaust Fans and Heads.)

Astle, H. J., & Co., Providence, R. I.
Cleveland Blow Pipe & Mfg. Co., Cleveland, Ohio.
Grand Rapids Blow Pipe & Dust Arrester Co., Grand Rapids, Mich.
Kirk & Blum Mfg. Co., Cincinnati, Ohio.
Monarch Engineering & Mfg. Co., Baltimore, Md

BLOWERS, HIGH PRESSURE

Leiman Bros., New York.

BOILER INSULATION (See Brick, Insulating; Insulating Cement.)

BOILER SETTING (See Fire Cement.)

BOILERS, WATER TUBE

Babcock & Wilcox Co., New York.

BORONIC ALLOYS

American Boron Products Co., Reading, Pa.

BRASS (See Brass Mill Products; Wire Mill Products; Anodes; Castings; Die Castings; Forgings; Ingots; Rods and Bars; Sheets; Strip Metal; Tubes; Wire.)

BRASS FOUNDERS (See Castings.)

BRASS FOUNDRY EQUIPMENT & SUPPLIES (See Kind Wanted.)

BRASS MILL ENGINEERS (See Engineers.)

BRASS MILL MACHINERY (Also See Kind Wanted.)

Blake & Johnson Company, Waterbury, Conn.
Mackintosh-Hemphill Co., Pittsburgh, Pa.

BRASS MILL PRODUCTS

Baltimore Brass Co., Baltimore, Md.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Mfg. Co., Seymour, Conn.
Western Cartridge Co., East Alton, Ill.

BRASS; SHEET, WIRE, ROD, TUBE (Also see Wire Mill Products; Rods and Bars; Sheets; Strip Metals; Tubes; Wire, Etc.)

American Brass Company, Waterbury, Conn.
Bristol Brass Co., Bristol, Conn.
Conklin, T. E., Brass & Copper Co., New York.
Dallas Brass & Copper Co., Chicago, Ill.
Hendricks Bros., New York.
Manhattan Brass Co., New York.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Mfg. Co., Seymour, Conn.
Taunton-New Bedford Copper Co., Taunton, Mass

BRASS WORKING LATHES (See Lathes.)

BRICK

Cork Paving

Armstrong Cork & Insulation Co., Pittsburgh, Pa

Insulating

Armstrong Cork & Insulation Co., Pittsburgh, Pa

BRITANNIA METAL

Standard Rolling Mills, Inc., Brooklyn, N. Y.

BRONZE (See also Anodes; Castings; Forgings; Ingots; Powdered; Rods and Bars; Tubes, Etc.)

Bearing

American Brass Co., Waterbury, Conn.

Phosphor, Tobin, Manganese

American Brass Co., Waterbury, Conn.
Conklin, T. E., Brass & Copper Co., New York.
Scovill Mfg. Co., Waterbury, Conn.

BRONZING LIQUID

Anderson Chemical Co., New York.
Celluloid Zapon Co., New York.
Egyptian Lacquer Mfg. Co., New York.
Nikolas, G. J., Co., Chicago, Ill.
Waukegan Chemical Co., Waukegan, Ill.
Zeller Lacquer Mfg. Co., New York.

BRUSHES

Dynamo

Corliss Carbon Co., Bradford, Pa.

Hand

Blumenthal, H., & Co., New York.
Munning, A. P., & Co., New York-Chicago.
Nikolas, G. J., Co., Chicago, Ill.
Paxson, J. W., Co., Philadelphia, Pa.

Scratch Wheel

Linfante, J. L., Jersey City, N. J.

Wheel

Blumenthal, H., & Co., New York.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.
Munning, A. P., & Co., New York-Chicago.

BUFFING AND POLISHING COMPOSITIONS

Bennett-O'Connell Co., Chicago, Ill.
Bruce Products Corp., Detroit, Mich.
Burns, E. Reed, Mfg. Corp., Brooklyn, N. Y.
Crown Rheostat & Supply Co., Chicago, Ill.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.

BUYERS' GUIDE: ADVERTISERS' PRODUCTS

Matchless Metal Polish Co., Chicago, Ill.—Glen Ridge, N. J.
Munning, A. P., & Co., New York-Chicago.
Oden Corp., College Point, L. I., N. Y.
Stevens, Frederic B., Detroit, Mich.

BUFFING AND POLISHING MACHINES (See Polishing and Buffing Machines.)

Cleveland Armature Works, Cleveland, Ohio.

BUFFING MACHINES, AUTOMATIC (Also see Polishing Lathes and Heads.)

Acme Mfg. Co., Detroit, Mich.
Divine Bros. Co., Utica, N. Y.

BUFFING AND POLISHING WHEELS (Also See Buffs.)

Canvas, Cotton, Etc.

Barker Bros., Inc., Brooklyn, N. Y.
Bennett-O'Connell Co., Chicago, Ill.
Codman, F. L. & J. C., Co., So. Boston, Mass.
Crown Rheostat & Supply Co., Chicago, Ill.
Divine Bros. Co., Utica, N. Y.
Eastern Felt Co., Winchester, Mass.
Guaranteed Buff Co., New York.
Lasalco, Inc., St. Louis, Mo.
Munning, A. P., & Co., New York-Chicago.
Ohio Buff & Mfg. Co., Cincinnati, Ohio.

Felt

Bacon Felt Co., Winchester, Mass.
Codman, F. L. & J. C., Co., So. Boston, Mass.
Divine Bros. Co., Utica, N. Y.
Eastern Felt Co., Winchester, Mass.

Sheepskin

Codman, F. L. & J. C., Co., So. Boston, Mass.

BUFFS (Also see Buffing and Polishing Wheels.)

Barker Bros., Inc., Brooklyn, N. Y.
Bennett-O'Connell Co., Chicago, Ill.
Burns, E. Reed, Mfg. Corp., Brooklyn, N. Y.
Codman, F. L. & J. C., Co., So. Boston, Mass.
Crown Rheostat & Supply Co., Chicago, Ill.
Divine Bros. Co., Utica, N. Y.
Guaranteed Buff Co., New York.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.
MacDermid Incorporated, Waterbury, Conn.
Munning, A. P., & Co., New York-Chicago.
Oden Corp., College Point, L. I., N. Y.
Ohio Buff & Mfg. Co., Cincinnati, Ohio.

BUILDING PAINT SPRAYERS

DeVilbiss Mfg. Co., Toledo, O.

BURNERS (Also see Furnaces.)

Air and Gas Pre-Mixing

Monarch Engineering & Mfg. Co., Baltimore, Md.

Oil or Gas

Campbell Hausfeld Co., Harrison, Ohio.
Johnson Gas Appliance Co., Cedar Rapids, Ia.
Mine & Smelter Supply Co., New York.

BURNISHING AND POLISHING BARRELS

Abbott Ball Co., Hartford, Conn.
Baird Machine Co., Bridgeport, Conn.
Crown Rheostat & Supply Co., Chicago, Ill.
Globe Machine & Stamping Co., Cleveland, Ohio.
Henderson Bros. Co., Waterbury, Conn.
No-Dust Drying Machine Co., Waterbury (Waterville Station), Conn.
Smith-Richardson Co., Attleboro, Mass.

BURNISHING COMPOUNDS AND CHIPS (Also see Soap.)

Abbott Ball Co., Hartford, Conn.
International Chemical Co., Philadelphia, Pa.

BUTANOL (Butyl Alcohol)

Commercial Solvents Corp., Terre Haute, Ind.

CANVAS WHEELS (See Buffing and Polishing Wheels.)

CARBONATE OF COPPER

Hardy, Chas., Inc., New York.

CARBOY TRUCK

Koven, L. O., & Bro., Jersey City, N. J.

CASTINGS

Aluminum

Light Mfg. & Foundry Co., Pottstown, Pa.
Scovill Mfg. Co., Waterbury, Conn.

Brass, Bronze and Composition

Ajax Metal Company, Philadelphia, Pa.
Ess, Anton, New York.
Light Mfg. & Foundry Co., Pottstown, Pa.
Scovill Mfg. Co., Waterbury, Conn.

Die

Light Mfg. & Foundry Co., Pottstown, Pa.

Zinc

New Jersey Zinc Sales Co., New York.

CAUSTIC SODA

International Chemical Co., Philadelphia, Pa.
MacDermid Incorporated, Waterbury, Conn.
Roessler & Hasslacher Chemical Co., New York.

CEMENT (See Fire Cement; Insulating Cement.)

CENTRIFUGAL DRYERS AND EXTRACTORS (Also see Drying-Out Machines.)

Tolhurst Machine Works, Troy, N. Y.

CHAIN GRATE STOKERS

Babcock & Wilcox Co., New York.

CHEMICALS, DEALERS IN ALL KINDS (Also see Kind Wanted.)

Bennett-O'Connell Co., Chicago, Ill.

CHEMISTS, CONSULTING (See Assayers and Chemists; Testing Laboratories.)

CHLORIDE OF IRON

Roessler & Hasslacher Chemical Co., New York.

CHUCKING MACHINES, AUTOMATIC

Baird Machine Co., Bridgeport, Conn.

CHUCKS

Spinning

Pryibil, P., Machine Co., New York.

Oval

Pryibil, P., Machine Co., New York.

CHROMIUM

Metal & Thermit Corp., New York.

CINDER CRUSHERS (See Crushers and Pulverizers; Reclaiming Machinery.)

CLEANERS, METAL, WASTE, GENERAL

Cowles Detergent Co., Lockport, N. Y.
Ford, J. B., Co., Wyandotte, Mich.
Fuller, W. A., Co., Greensburg, Pa.
Greasalt Products Co., New York.
International Chemical Co., Philadelphia, Pa.
Magnuson Products Corp., Brooklyn, N. Y.
Oakley Chemical Co., New York.

CLEANING APPARATUS, AUTOMATIC METAL (Also see Pickling Machines.)

U. S. Galvanizing & Plating Equipment Corp., Brooklyn, N. Y.

CLEANING COMPOUNDS (See also Fig Cleanser; Pickling Compounds, Whale Oil Soaps.)

Metal

Anthony, H. M., Co., New York.
Cowles Detergent Co., Lockport, N. Y.
Ford, J. B., Co., Wyandotte, Mich.
Fuller, W. A., Co., Greensburg, Pa.
Greasalt Products Co., New York.
International Chemical Co., Philadelphia, Pa.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
Magnus Chemical Co., Brooklyn, N. Y.
Magnuson Products Corp., Brooklyn, N. Y.
Matchless Metal Polish Co., Chicago, Ill.—Glen Ridge, N. J.
Munning, A. P., & Co., New York-Chicago.
Oakley Chemical Co., New York.
Stevens, Frederic B., Detroit, Mich.

COILERS, SHEET METAL

Blake & Johnson Company, Waterbury, Conn.

COMPOSITION METAL (See Castings; Ingot, Etc.)

COMPOSITIONS (See Buffing and Polishing Compositions; Flooring Compositions.)

COMPOUNDS, CUTTING AND GRINDING, DRAWING, STAMPING

International Chemical Co., Philadelphia, Pa.
Magnuson Products Corp., Brooklyn, N. Y.
Oakley Chemical Co., New York.

COMPRESSORS, AIR & GAS (See Air Compressors.)

CONCENTRATING TABLES (See also Reclaiming Machinery.)

Mine & Smelter Supply Co., New York.

CONSULTING METALLURGIST

Rohmer, Gabriel E., New York.

CONTRACT WORK (See Castings; Die-Castings; Dies; Electro-Galvanizing; Electro-Plating; Forgings; Hot Galvanizing and Tinning; Plating, Barrel Method; Polishing and Burnishing, Etc.)

COPPER (Also see Anodes; Castings; Ingots, Rods and Bars; Sheets; Smelters and Refiners; Strip Metal; Tubes; Wire, Etc.)

Sheet, Wire, Rod, Tube

American Brass Co., Waterbury, Conn.
Conklin, T. E., Brass & Copper Co., New York

COPPER-ALUMINUM, Boronic

American Boron Products Co., Reading, Pa.

COPPER BEARING MATERIAL, BUYERS OF (See Drosses, Residues, Etc.)

COPPER BORONIC

American Boron Products Co., Reading, Pa.

COPPER, CARBONATE OF

Crown Rheostat & Supply Co., Chicago, Ill.
Middlesex Aniline Co., Lincoln, N. J.

COPPER-CYANIDE

American Cyanamid Co., New York.
Hardy, Chas., Inc., New York.
Kyle, Geo. W., Company, New York.
Middlesex Aniline Co., Lincoln, N. J.
Roessler & Hasslacher Chemical Co., New York.

COPPER-NICKEL, BORONIC

American Boron Products Co., Reading, Pa.

CORE MACHINES

Stevens, Frederic B., Detroit, Mich.

CORE OIL AND COMPOUNDS

Buckeye Products Co., Cincinnati, Ohio.
Stevens, Frederic B., Detroit, Mich.

CORE OVEN INSULATION (See Brick, Insulating; Insulating Cement; Insulation Oven.)

CORE OVENS

Coal and Coke

Monarch Engineering & Mfg. Co., Baltimore, Md.
Steiner, E. B., & Co., Newark, N. J.
Stevens, Frederic B., Detroit, Mich.

Oil and Gas

Monarch Engineering & Mfg. Co., Baltimore, Md.
Stevens, Frederic B., Detroit, Mich.

CORE SAND MIXERS

National Engineering Co., Chicago, Ill.

COUPLES

Dixon, Joseph, Crucible Co., Jersey City, N. J.

CRUCIBLES, METAL MELTING

Bartley, Jonathan, Crucible Co., Trenton, N. J.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Lava Crucible Co. of Pittsburgh, Pittsburgh, Pa.
McCullough-Dalzell Crucible Co., Pittsburgh, Pa.
Naugatuck Valley Crucible Co., Shelton, Conn.
Ross Tacony Crucible Co., Tacony, Philadelphia, Pa.
Seidel, R. B., Inc., Philadelphia, Pa.
Stevens, Frederic B., Detroit, Mich.

BUYERS' GUIDE: ADVERTISERS' PRODUCTS

CRUCIBLE TONGS (See Tongs.)

CRUSHERS AND PULVERIZERS (See also Reclaiming Machinery.)

Mine & Smelter Supply Co., New York.
Standard Equipment Co., New Haven, Conn.

CUPRO-NICKEL (See Brass Mill Products.)

CUT-OFF GATES (Galvanized Steel)

Grand Rapids Blow Pipe & Dust Arrester Co., Grand Rapids, Mich.

CUTTING, STRAIGHTENING & FORMING MACHINERY

Wire

Baird Machine Co., Bridgeport, Conn.
Shuster, F. B., Co., New Haven, Conn.

Strip Metal

Baird Machine Co., Bridgeport, Conn.
Shuster, F. B., Co., New Haven, Conn.

CYANIDE (See also Copper-Cyanide; Silver Cyanide; Sodium Cyanide; Zinc Cyanide.)

American Cyanamid Co., New York.
Buchanan, Thos., Co., Cincinnati, Ohio.
Crown Rheostat & Supply Co., Chicago, Ill.

DEOXIDIZERS, METAL (See also Fluxes.)

Alloys & Products, Inc., New York.

DIE CASTING MACHINES

Soft Metal

Byrd, R. H., Erie, Pa.

DIPPING BASKETS

Automatic

U. S. Galvanizing & Plating Equipment Corp., Brooklyn, N. Y.

Stoneware

General Ceramics Co., New York.

DRAW BENCHES

Wire, Rod, Tube

Watson-Stillman Co., New York.

Light Wire

Leiman Bros., New York.

DRAWING AND STAMPING (See Metal Goods Made to Order; Stamping and Drawing.)

DRILLING MACHINES

Light Sensitive

Leiman Bros., New York.

DRINKING WATER SUPPLY SYSTEMS

Armstrong Cork & Insulation Co., Pittsburgh, Pa.

DROP LIFTERS (See also Presses, Drop Lifters for.)

Automatic

Miner & Peck Mfg. Co., Derby, Conn.

DROSSES, RESIDUES, ETC., BUYERS OF (Also see Metal Dealers, Old.)

Balbach Metals Corp., New York, N. Y.
Capper, Pass & Son, Ltd., Bristol, England.
Nassau Smelting & Refining Co., New York.

DRYERS (See Centrifugal Dryers; Ovens; Drying-Out Machines; Ladle Heaters and Dryers; Mold Dryers; and Dryers; Sawdust Drying-Out Boxes.)

DRYING-OUT MACHINES (See also Centrifugal Dryers and Extractors; Sawdust Drying-Out Boxes.)

Baird Machine Co., Bridgeport, Conn.
No-Dust Drying Machine Co., Waterbury (Waterville, Station), Conn.
Smith-Richardson Co., Attleboro, Mass.

Automatic

Astle, H. J., & Co., Providence, R. I.
No-Dust Drying Machine Co., Waterbury (Waterville Station), Conn.
Tolhurst Machine Works, Troy, N. Y.
U. S. Galvanizing & Plating Equipment Corp., Brooklyn, N. Y.

DUST COLLECTORS AND VENTILATING SYSTEMS (Also see Exhaust Fans and Heads.)

American Foundry Equipment Co., New York.
Astle, H. J., & Co., Providence, R. I.
Cleveland Blow Pipe & Mfg. Co., Cleveland, Ohio.
Grand Rapids Blow Pipe & Dust Arrester Co., Grand Rapids, Mich.
Kirk & Blum Mfg. Co., Cincinnati, O.
No-Dust Drying Machine Co., Waterbury (Waterville Station), Conn.

DYNAMO BRUSHES

Corliss Carbon Co., Bradford, Pa.

DYNAMOS, LOW VOLTAGE, PLATING AND GALVANIZING (Also see Electrical Apparatus and Equipment.)

Bennett-O'Connell Co., Chicago, Ill.
Bogue, Chas. J., Electric Co., New York.
Connecticut Dynamo & Motor Co., Irvington, N. J.
Crown Rheostat & Supply Co., Chicago, Ill.
Eager Electric Co., Watertown, N. Y.
Jants & Leist Electric Co., Cincinnati, O.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.
Meaker Galvanizing Co., Chicago, Ill.
Munning, A. P., & Co., New York-Chicago.
Stevens, Frederic B., Detroit, Mich.
U. S. Galvanizing & Plating Equipment Corp., Brooklyn, N. Y.

DYNAMOS, PLATING, USED

Fuerst-Friedman Co., Cleveland, Ohio.
Klein, Nathan, & Co., New York.

ELECTRICAL APPARATUS AND EQUIPMENT (Also see Ammeters, Rheostats, Switchboards, Transformers, Voltmeters.)

Bennett-O'Connell Co., Chicago, Ill.
Bogue, Chas. J., Electric Co., New York.

ELECTRIC CRANES (See Cranes.)

ELECTRIC FURNACES

Annealing, Hardening, Etc.

Detroit Electric Furnace Co., Detroit, Mich.
Rockwell, W. S., Company, New York.

Laboratory

Detroit Electric Furnace Co., Detroit, Mich.

Melting

Ajax Metal Co., Philadelphia, Pa.
Detroit Electric Furnace Co., Detroit, Mich.

ELECTRIC HOISTS (See Hoists.)

ELECTRIC OVENS (See Ovens; also Core Ovens.)

ELECTRO-GALVANIZING, JOB AND CONTRACT

Hassall, John, Inc., Brooklyn, N. Y.
Meaker Galvanizing Co., Chicago, Ill.
Mercil, B., & Sons, Plating Co., Chicago, Ill.
U. S. Galvanizing & Plating Equipment Corp., Brooklyn, N. Y.

ELECTRO GALVANIZING EQUIPMENT AND SUPPLIES (See Dynamos; Plating Barrels; Plating Machines, Automatic; Tanks, etc.)

ELECTRO PLATING, JOB & CONTRACT (Also see Polishing and Burnishing; Plating, Barrel Method.)

Hassall, John, Inc., Brooklyn, N. Y.
Mercil, B., & Sons, Plating Co., Chicago, Ill.

ELECTRO-GALVANIZING SOLUTION

Meaker Galvanizing Co., Chicago, Ill.

ELECTRO PLATING EQUIPMENT AND SUPPLIES (See also Kind Wanted.)

Hanson & Van Winkle Co., Newark, N. J.

EMERY (Also see Abrasives.)

Crown Rheostat & Supply Co., Chicago, Ill.
Matchless Metal Polish Co., Chicago, Ill. - Glen Ridge, N. J.
Stevens, Frederic B., Detroit, Mich.

EMERY PASTE

Harshaw, Fuller & Goodwin Co., Philadelphia, Pa.

ENAMELING OVENS (See Ovens.)

ENAMELS

Colored

Celluloid Zapon Co., New York.
Egyptian Lacquer Mfg. Co., New York.
Hilo Varnish Corp., Brooklyn, N. Y.
Kay and Ess Co., Dayton, Ohio.
Maas & Waldstein Co., New York.
Nikolas, G. J., & Co., Chicago, Ill.
Waukegan Chemical Co., Waukegan, Ill.
Zeller Lacquer Mfg. Co., New York.

Lacquer

Celluloid Zapon Co., New York.
Egyptian Lacquer Mfg. Co., New York.
Hilo Varnish Corp., Brooklyn, N. Y.
Kay and Ess Co., Dayton, Ohio.
Maas & Waldstein Co., New York.
Nikolas, G. J., Co., Chicago, Ill.
Waukegan Chemical Co., Waukegan, Ill.
Zeller Lacquer Mfg. Co., New York.

Wood

Celluloid Zapon Co., New York.
Egyptian Lacquer Mfg. Co., New York.
Hilo Varnish Corp., Brooklyn, N. Y.
Waukegan Chemical Co., Waukegan, Ill.
Zeller Lacquer Mfg. Co., New York.

ENAMEL SPRAYERS (See Sprayers.)

ENGINEERS

Consulting Metallurgist

Rohmer, Gabriel E., New York.

Furnace

Mine & Smelter Supply Co., New York.
Monarch Engineering & Mfg. Co., Baltimore, Md.
Rockwell, W. S., Company, New York.

Polishing and Grinding

Bridgeport Safety Emery Wheel Co., Bridgeport, Conn.
Divine Bros. Co., Utica, N. Y.

ESCUTCHEON PINS, ALL METAL

Hassall, John, Inc., Brooklyn, N. Y.

ETHYL ACETATE

Nikolas, G. J., & Co., Chicago, Ill.

EXHAUST BOOTHS AND BENCHES FOR LACQUERING

Eureka Pneumatic Spray Co., Richmond Hill, N. Y.

EXHAUST FANS AND HEADS (Also see Blowers and Blow Piping; Dust Collectors and Ventilating Systems.)

Cleveland Blow Pipe & Mfg. Co., Cleveland, Ohio.
Grand Rapids Blow Pipe & Dust Arrester Co., Grand Rapids, Mich.

EXTRUDED SHAPES

Brass, Copper and Bronze

Scovill Mfg. Co., Waterbury, Conn.

FACING SAND MIXERS

National Engineering Co., Chicago, Ill.

FACINGS (See Foundry Facings.)

FELT, POLISHING

American Felt Co., Boston, Mass.
Bacon Felt Company, Winchester, Mass.

FELT POLISHING WHEELS (Also see Buffing and Polishing Wheels.)

Bacon Felt Co., Winchester, Mass.
Codman, F. L. & J. C., Co., So. Boston, Mass.
Crown Rheostat & Supply Co., Chicago, Ill.
Divine Bros. Co., Utica, N. Y.
Eastern Felt Co., Winchester, Mass.

FELT SHEETS

American Felt Co., Boston, Mass.
Bacon Felt Co., Winchester, Mass.
Eastern Felt Co., Winchester, Mass.

FERRULES, BRASS AND COPPER

American Brass Co., Waterbury, Conn.

FIG CLEANERS (Also see Cleaning Compounds, Whale Oil Soap.)

International Chemical Co., Philadelphia, Pa.

FILM COATINGS

Waukegan Chemical Co., Waukegan, Ill.

BUYERS' GUIDE: ADVERTISERS' PRODUCTS

FIRE CEMENT

Buckeye Products Co., Cincinnati, Ohio.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Lava Crucible Co. of Pittsburgh, Pittsburgh, Pa.
Quigley Furnace Specialties Co., New York.

FLINT SHOT

U. S. Silica Co., Chicago, Ill.

FLOORING COMPOSITION

Armstrong Cork & Insulation Co., Pittsburgh, Pa.

FLUXES

Metal Melting

American Boron Products Co., Reading, Pa.

Soldering and Tinning

Johnson Mfg. Co., Chicago, Ill.

FORGINGS (Also see Automobile Forgings.)

Brass and Bronze

Scovill Mfg. Co., Waterbury, Conn.

FOUNDRY EQUIPMENT AND SUPPLIES (See Kind Wanted.)

FOUNDRY ENGINEERS (See Engineers.)

FOUNDRY FACINGS

Dixon, Joseph, Crucible Co., Jersey City, N. J.
Paxson, J. W., Co., Philadelphia, Pa.
Stevens, Frederic B., Detroit, Mich.

FOUNDRY RIDDLES (See Sand Sifters.)

FOUNDRY SPRAYERS (See Sprayers.)

FURNACE CEMENT (See Fire Cement.)

FURNACE ENGINEERS (See Engineers.)

FURNACE INSULATION (See Brick Insulating; Insulating Cement; Insulation, Furnace.)

FURNACES (See Annealing Furnaces; Burners; Electric Furnaces; Galvanizing & Tinning Furnaces; Heat Treating Furnaces; Melting Furnaces; Powdered Coal Burning Furnaces; Sherardizing Furnaces; Smelting Furnaces.)

FURNACE TILE AND LININGS (Also see Fire Brick.)

Monarch Engineering & Mfg. Co., Baltimore, Md.
Quigley Furnace Specialties Co., New York.

FUSE METAL

Platt Bros. & Co., Waterbury, Conn.

FUSEL OIL

Nikolas, G. J., & Co., Chicago, Ill.

FUSEL OIL SUBSTITUTE

Commercial Solvents Corp., Terre Haute, Ind.

GALVANIZING (See also Electric Galvanizing, Job, and Contract; Hot Galvanizing, Job and Contract.)

New Jersey Zinc Sales Co., New York.

GALVANIZING AND TINNING FURNACES (Also see Burners.)

Monarch Engineering & Mfg. Co., Baltimore, Md.

GALVANIZING EQUIPMENT AND SUPPLIES (See Kinds Wanted. Also Plating Galvanizing Machines, Automatic; Hot and Galvanizing Barrels; Plating and Galvanizing and Tinning Equipment.)

GAS APPLIANCES

Johnson Gas Appliance Co., Cedar Rapids, Ia.

GAS BURNERS (See Burners.)

GATE CUTTERS (See Saws; Sprue Cutters.)

GENERATORS (See Dynamos; Motor-Generator Sets.)

GLUE FOR POLISHING

Divine Bros. Co., Utica, N. Y.

GLUE HEATERS AND POTS

Divine Bros. Co., Utica, N. Y.

GOLD (See Anodes; Bars; Metal Dealers; Smelters and Refiners.)

GOLD, BORONIC

American Boron Products Co., Reading, Pa.

GRAPHITE PRODUCTS, PHOSPHORIZERS STIRRERS, ETC. (Also see Crucibles.)

Bartley, Jonathan, Crucible Co., Trenton, N. J.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
McCullough-Dalzell Crucible Co., Pittsburgh, Pa.
Naugatuck Valley Crucible Co., Shelton, Conn.
Ross-Tacony Crucible Co., Tacony, Philadelphia, Pa.
Seidel, R. B., Inc., Philadelphia, Pa.

GRINDING MACHINES

Cleveland Armature Works, Cleveland, Ohio.
Connecticut Dynamo & Motor Co., Irvington, N. J.
Stevens, Frederic B., Detroit, Mich.

GRINDING PANS

National Engineering Co., Chicago, Ill.

GRINDING, POLISHING AND PLATING MATERIALS

Walter C. Gold, Philadelphia, Pa.

GRINDING WHEELS

Walter C. Gold, Philadelphia, Pa.

GRINDING WHEEL HOODS (See Dust Collectors and Ventilating Systems; Hoods.)

HEAT TREATING FURNACES, ELECTRIC

Detroit Electric Furnace Co., Detroit, Mich.

HOODS (Also see Dust Collectors and Ventilating Systems.)

Polishing and Grinding Wheel

Cleveland Blow Pipe & Mfg. Co., Cleveland, Ohio.
Grand Rapids Blow Pipe & Dust Arrester Co., Grand Rapids, Mich.
Kirk & Blum Mfg. Co., Cincinnati, Ohio.

Spraying

DeVilbiss Mfg. Co., Toledo, Ohio.
Grand Rapids Blow Pipe & Dust Arrester Co., Grand Rapids, Mich.

HOT GALVANIZING AND TINNING EQUIPMENT (See Burners; Galvanizing and Tinning Furnaces; Kettles; Tanks.)

HOT TINNING EQUIPMENT (See Hot Galvanizing and Tinning Equipment.)

HYDRAULIC MACHINERY, PRESSES, JACKS, ETC. (Also see Accumulators, Presses.)

Watson-Stillman Co., New York.

INGOT MOLDS (See Molds.)

INGOTS (Also see Calcium-Copper; Manganese-Copper; Phosphor-Copper; Phosphor-Tin; Silicon-Copper; Smelters and Refiners.)

Aluminum

British Aluminum Co., New York and Toronto, Ontario.
Niagara Falls Smelting & Refining Corp., Buffalo N. Y.

Brass, Bronze and Composition

Ajax Metal Company, Philadelphia, Pa.
Belmont Smelting & Refining Works, Brooklyn, N. Y.
Lehman Bros., Hoboken, N. J.
Niagara Falls Smelting & Refining Corp., Buffalo, N. Y.
Tottenville Copper Co., Inc., Tottenville, N. Y.
Whipple & Choate Company, Bridgeport, Conn.

Copper

Balbach Metals Corp., New York, N. Y.
Hendricks Bros., New York.
Tottenville Copper Co., Inc., Tottenville, N. Y.
Trotter, Nathan, & Co., Philadelphia, Pa.

Lead

United Metals Selling Co., New York.

Manganese-Bronze

Tottenville Copper Co., Inc., Tottenville, N. Y.
Whipple & Choate Company, Bridgeport, Conn.

Silver

Handy & Harmon, New York.

Tin

Ajax Metal Co., Philadelphia, Pa.

White Metals

Michigan Smelting & Refining Co., Detroit, Mich.

INSULATING BRICK, BLOCK, POWDER AND CEMENT (See also Brick.)

Armstrong Cork & Insulation Co., Pittsburgh, Pa.

INSULATING CEMENT, HEAT

Armstrong Cork & Insulation Co., Pittsburgh, Pa.
Quigley Furnace Specialties Co., New York.

INSULATION (Also see Brick, Insulating; Insulating Cement.)

Boiler

Armstrong Cork & Insulation Co., Pittsburgh, Pa.

Oven

Armstrong Cork & Insulation Co., Pittsburgh, Pa.

Furnace

Armstrong Cork & Insulation Co., Pittsburgh, Pa.

Pipe

Armstrong Cork & Insulation Co., Pittsburgh, Pa.

IRON CASTINGS (See Castings.)

JAPAN REMOVERS

International Chemical Co., Philadelphia, Pa.
Oakley Chemical Co., New York.

JAPANS, ALL KINDS

Hilo Varnish Corp., Brooklyn, N. Y.

JAPANNING BARRELS (See Tumbling Barrels.)

JAPANNING OVENS (See Ovens)

JEWELERS' BRUSHES (See Brushes.)

JEWELERS' EQUIPMENT (Also see Kind Wanted.)

Leiman Bros., New York.
Smith-Richardson Co., Attleboro, Mass.

JEWELERS' ROLLS (See Rolls.)

JEWELERS' SOLDER (See Solders.)

JIGS, FIXTURES, ETC. (See Tools, Jigs, Fixtures.)

LABORATORIES (See Testing Laboratories.)

LABORATORY SUPPLIES

Mine & Smelter Supply Co., New York.

LACQUERING BARRELS (See Tumbling Barrels.)

LACQUERING, JOB AND CONTRACT

Merrill, B., & Sons, Plating Co., Chicago, Ill.

BUYERS' GUIDE: ADVERTISERS' PRODUCTS

LACQUER ENAMELS (See Enamels.)

LACQUER OVENS (See Ovens.)

LACQUERS

Colored

Celluloid Zapon Company, New York.
Egyptian Lacquer Mfg. Co., New York.
Hilo Varnish Corp., Brooklyn, N. Y.
Maas & Waldstein Co., New York.
Nikolas, G. J., Co., Chicago, Ill.
Waukegan Chemical Co., Waukegan, Ill.
Zeller Lacquer Mfg. Co., New York.

For Incandescent Lamps

Egyptian Lacquer Mfg. Co., New York.

Metal

Anderson Chemical Co., New York.
Celluloid Zapon Company, New York.
Egyptian Lacquer Mfg. Co., New York.
L'Hommedieu, Chas. F. & Sons Co., Chicago, Ill.
Maas & Waldstein Co., New York.
Nikolas, G. J., Co., Chicago, Ill.
Waukegan Chemical Co., Waukegan, Ill.
Zeller Lacquer Mfg. Co., New York.

Wood

Anderson Chemical Co., New York.
Celluloid Zapon Co., New York.
Egyptian Lacquer Mfg. Co., New York.
Waukegan Chemical Co., Waukegan, Ill.
Zeller Lacquer Mfg. Co., New York.

LACQUER REMOVERS

Egyptian Lacquer Mfg. Co., New York.
International Chemical Co., Philadelphia, Pa

LACQUER SPRAYERS (See Sprayers.)

LADLE HEATERS AND DRYERS

Hawley Down-Draft Furnace Co., Easton, Pa.
Monarch Engineering & Mfg. Co., Baltimore, Md.

LATHES (See also Polishing Lathes.)

Metal Spinning and Wood Turning

Pryibil, P., Machine Co., New York.

LEAD BURNING

Abernethy, John F., Brooklyn, N. Y.

LEAD-LINED TANKS (See Tanks.)

LEATHER POLISHING WHEELS (See Buffing and Polishing Wheels.)

LOCOMOTIVES, INDUSTRIAL (See Electric Locomotives.)

LUBRICANTS, Cutting and Grinding, Drawing, Stamping

International Chemical Co., Philadelphia, Pa.
Oakley Chemical Co., New York.

MAGNESIUM METAL

Sheet, Wire, Rod, Ribbon, Powder

Leavitt, C. W., & Co., New York.

MAGNETIC SEPARATORS (See also Reclaiming Machinery.)

Magnetic Mfg. Co., Milwaukee, Wis.
Paxson, J. W., Co., Philadelphia, Pa.

MANGANESE

Metal & Thermit Corp., New York.

MANGANESE-BRONZE (See Ingots.)

MANGANESE-COPPER (Also see Ingots.)

Ajax Metal Company, Philadelphia, Pa.
Electric Smelting & Aluminum Co., Lockport, N. Y.
Metal & Thermit Corp., New York.

MANTLE DIP

Nikolas, G. J., Co., Chicago, Ill.

MELTING FURNACES (Also see Burners; Galvanising and Tinning Furnaces; Tank Furnaces.)

Brass

Detroit Electric Furnace Co., Detroit, Mich.

Coal and Coke

Monarch Engineering & Mfg. Co., Baltimore, Md.

Electric

Detroit Electric Furnace Co., Detroit, Mich.

Oil or Gas

Buckeye Products Co., Cincinnati, Ohio.
Campbell-Hausfeld Co., Harrison, Ohio.
Hawley Down-Draft Furnace Co., Easton, Pa.
Johnson Gas Appliance Co., Cedar Rapids, Ia.
Kenworthy, Chas. F., Inc., Waterbury, Conn.
Mine & Smelter Supply Co., New York.
Monarch Engineering & Mfg. Co., Baltimore, Md.

Pit

Monarch Engineering & Mfg. Co., Baltimore, Md.
Paxson, J. W., Co., Philadelphia, Pa.
Stevens, Frederic B., Detroit, Mich.

Reverberatory

Hawley Down-Draft Furnace Co., Easton, Pa.
Monarch Engineering & Mfg. Co., Baltimore, Md.

METAL BRIQUETTES (See Briquet-Ingots.)

METAL CLEANERS (See also Cleaning Compounds.)

Cowles Detergent Co., Lockport, N. Y.
Ford, J. B., Co., Wyandotte, Mich.
Fuller, W. A., Co., Greensburg, Pa.
Greasalt Products Co., New York.
Hanson & Van Winkle Co., Newark, N. J.
International Chemical Co., Philadelphia, Pa.
MacDermid, Inc., Waterbury, Conn.
Magnus Chemical Co., Brooklyn, N. Y.
Magnuson Products Corp., Brooklyn, N. Y.
Oakley Chemical Co., New York.
Rhodes, James H., & Co., Chicago, Ill.

METAL DEALERS (Also see Drosses, Residues, Etc., Buyers of; Turnings, Chips, Etc., Buyers of.)

Gold, Silver, Platinum

Radnai, Josef, New York.
Roessler & Hasslacher Chemical Co., New York.

New Metals

Nassau Smelting & Refining Co., New York.
Trotter, Nathan, & Co., Philadelphia, Pa.

Old Metals

Belmont Smelting & Refining Works, Inc., Brooklyn, N. Y.
Lehman Bros., Hoboken, N. J.

Rare Metals

Radnai, Josef, New York.

Zinc

New Jersey Zinc Sales Co., New York.

METAL DRYERS, CENTRIFUGAL

Tolhurst Machine Works, Troy, N. Y.
No-Dust Drying Machine Co., Waterbury, Conn.

METAL GOODS MADE TO ORDER (Also see Stamping and Drawing.)

Cambridge Novelty Co., Cambridge, Mass.
Richter, Emil, Crottendorf, Germany.
Scovill Mfg. Co., Waterbury, Conn.
Sterling Art Metal Works, New York.
Stuart-Oliver Metal Spinning Co., Rochester, N. Y.
Western Cartridge Co., East Alton, Ill.

METAL POLISH

Hanson & Van Winkle Co., Newark, N. J.
Matchless Metal Polish Co., Chicago, Ill.—Glen Ridge, N. J.

METAL RECLAIMING EQUIPMENT (See Concentrating Tables; Crushers and Pulverizers; Magnetic Separators.)

METALS (See also Kinds Wanted. Also Metal Dealers.)

Bearing

American Brass Co., Waterbury, Conn.

Extruded and Die Pressed

American Brass Co., Waterbury, Conn.

METALS, PLATED SHEET (See Plated and Polished Sheet Metals; Sheets.)

METALS, RARE (See Metal Dealers.)

MILLS, CRUSHING (See also Crushers and Pulverizers.)

Mine & Smelter Supply Co., New York.

MILLS, PAN

National Engineering Co., Chicago, Ill.

MIXERS, SAND

National Engineering Co., Chicago, Ill.

MOLD DRYERS, PORTABLE

Monarch Engineering & Mfg. Co., Baltimore, Md.

MOLDING MACHINES

Power

American Foundry Equipment Co., New York.

MOLD MAKERS

Andersen, Alf., New York.
Felek, Julius, New York.

MOLDING SAND (See Sand.)

MOLDS (See also Mold Makers.)

Babbitt and Solder

Fanning, J. P., Co., Brooklyn, N. Y.
Schweizer, Chas. K., St. Louis, Mo.

Ingot

Fanning, J. P., Co., Brooklyn, N. Y.
Schweizer, Chas. K., St. Louis, Mo.

MOLD SPRAYERS (See Sprayers.)

MOTOR CONTROL EQUIPMENT (See Electrical Apparatus and Equipment.)

MOTORS (Also see Electrical Apparatus and Equipment.)

MOTOR-GENERATOR SETS (Also see Dynamos; Electrical Apparatus and Equipment.)

Bennett-O'Connell Co., Chicago, Ill.
Connecticut Dynamo & Motor Co., Irvington, N. J.
Crown Rheostat & Supply Co., Chicago, Ill.
Enger Electric Co., Watertown, N. Y.
Jantz & Leist Electric Co., Cincinnati, Ohio.
L'Hommedieu, Chas. F. & Sons Co., Chicago, Ill.
Munning, A. P., & Co., New York-Chicago.

MUFFLES

Dixon, Joseph, Crucible Co., Jersey City, N. J.
Mine & Smelter Supply Co., New York.

MUNTZ METAL (See Sheets.)

NICKEL (See Anodes; Castings; Sheets; Wire; Etc.)

NICKEL BORONIC

American Boron Products Co., Reading, Pa.

NICKEL CARBONATE, MOIST AND DRY

Harshaw, Fuller & Goodwin Co., Cleveland, Ohio.
Middlesex Aniline Co., Lincoln, N. J.

NICKEL CHLORIDE

Harshaw, Fuller & Goodwin Co., Cleveland, Ohio.
Middlesex Aniline Co., Lincoln, N. J.

NICKEL SALTS

Buchanan, Thos., Co., Cincinnati, Ohio.
Crown Rheostat & Supply Co., Chicago, Ill.
Ely Anode & Supply Co., New York.
Harshaw, Fuller & Goodwin Co., Cleveland, Ohio.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.
MacDermid Incorporated, Waterbury, Conn.
Middlesex Aniline Co., Lincoln, N. J.
Munning, A. P., & Co., New York-Chicago.
Roessler & Hasslacher Chemical Co., New York.
Stevens, Frederic B., Detroit, Mich.

NICKEL SHOT

Seymour Mfg. Co., Seymour, Conn.

NICKEL SILVER (See also Brass, Sheets, Wire, Rod, Tube Castings; Forgings; Sheets; etc.)

Sheets, Wire, Rod Tube

American Brass Co., Waterbury, Conn.
Conklin, T. E., Brass & Copper Co., New York.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Mfg. Co., Seymour, Conn.

BUYERS' GUIDE: ADVERTISERS' PRODUCTS

NICKEL SULPHATE, SINGLE AND DOUBLE

Harshaw, Fuller & Goodwin Co., Cleveland, Ohio.
Middlesex Aniline Co., Lincoln, N. J.

OIL OF SALT

Mosso, C. A., Laboratories, Chicago, Ill.

OIL BURNERS (See Burners.)

OIL PUMPS (See Oil Storage Systems.)

Monarch Engineering & Mfg. Co., Baltimore, Md.

OLD METALS (See Drosses, Residues, Etc., Buyers of; Metal Dealers.)

OVENS (Also see Burners; also Core Ovens.)

Enameling, Lacquering, Japanning

Steiner, E. E., & Co., Newark, N. J.

OVEN BURNERS (See Burners.)

OVEN INSULATION (See Brick, Insulating; Insulating Cement; Insulation.)

OXIDIZING SOLUTIONS

Sulphur Products Co., Greensburg, Pa.

PAINT SPRAYERS (See Sprayers.)

PARKERIZING

Parker Rust Proof Co., Detroit, Mich.

PARTING COMPOUNDS

Buckeye Products Co., Cincinnati, Ohio.

PATTERN SHOP EQUIPMENT (See Lathes; Saws.)

PAVING BRICK, CORK (See Brick.)

PHOSPHOR BRONZE (See also Ingots.)

Ajax Metal Company, Philadelphia, Pa.

PHOSPHORIZERS (See Graphite Products.)

PHOSPHOR-COPPER (Also see Ingots.)

Ajax Metal Company, Philadelphia, Pa.
Electric Smelting & Aluminum Co., Lockport, N. Y.

PHOSPHOR-COPPER, BORONIC

American Boron Products Co., Reading, Pa.

PHOSPHOR-TIN (See also Ingots.)

Ajax Metal Company, Philadelphia, Pa.

PHOSPHOR-TIN, BORONIC

American Boron Products Co., Reading, Pa.

PHOSPHORUS

General Chemical Co., Philadelphia, Pa.

PICKLING COMPOUND (See Cleaning Compounds.)

PICKLING MACHINES, AUTOMATIC

No-Dust Drying Machine Co., Waterbury (Waterville Station), Conn.
U. S. Galvanizing & Plating Equipment Corp., Brooklyn, N. Y.

PIPE, BRASS AND COPPER

American Brass Co., Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.

PIPE AND BOILER COVERINGS, STEAM, ICE WATER, BRINE (See also Insulation.)

Armstrong Cork & Insulation Co., Pittsburgh, Pa.

PLATED AND POLISHED SHEET METALS (See also Sheets.)

American Nickeloid Co., Peru, Ill.

PLATERS' BRUSHES (See Brushes.)

PLATERS' COMPOUND (See Whale Oil Soap.)

PLATING BARRELS, ROTARY

Lasalco, Inc., St. Louis, Mo.

PLATING AND GALVANIZING BARRELS

Connecticut Dynamo & Motor Co., Irvington, N. J.
Daniels & Orben Co., Inc., New York.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.
Meaker Galvanizing Co., Chicago, Ill.
Munning, A. P., & Co., New York-Chicago.
U. S. Galvanizing & Plating Equipment Corp., Brooklyn, N. Y.

PLATING AND GALVANIZING MACHINES, AUTOMATIC (Also see Plating Barrels.)

Meaker Galvanizing Co., Chicago, Ill.
U. S. Galvanizing & Plating Equipment Corp., Brooklyn, N. Y.

PLATING, BARREL METHOD, JOB AND CONTRACT (Also see Electroplating.)

Mercil, B., & Sons, Plating Co., Chicago, Ill.

PLATING EQUIPMENT AND SUPPLIES (See Kind Wanted.)

PLATING GENERATORS

Holland, J., & Sons, Brooklyn, N. Y.
Lasalco, Inc., St. Louis, Mo.

PLATING MATERIALS

Walter C. Gold, Philadelphia, Pa.

PLATING SOLUTION AGITATOR

Rausch Mfg. Co., Racine, Wis.

PLATINUM (See Smelters and Refiners; Anodes; Bars; Metal Dealers; Sheets; Etc.)

PLATINUM BUFFING CAKE (See Buffing and Polishing Compositions.)

PLUMBAGO (See Graphite Products.)

POLISHING ABRASIVES

Abrasive Company, Bridesburg, Philadelphia, Pa.

POLISHING BARRELS (See Burnishing Barrels.)

POLISHING COMPOSITION (See Buffing and Polishing Compositions.)

POLISHING DUST COLLECTING OUTFITS

Small

Leiman Bros., New York.

POLISHING EQUIPMENT AND SUPPLIES (See also Kinds Wanted.)

POLISHING FELTS

American Felt Co., Boston, Mass.
Bacon Felt Co., Winchester, Mass.
Eastern Felt Co., Winchester, Mass.

POLISHING HOODS (See Dust Collectors and Ventilating Systems; Hoods.)

POLISHING LATHES AND HEADS

Bennett-O'Connell Co., Chicago, Ill.
Cleveland Armature Wks., Cleveland, Ohio.
Connecticut Dynamo & Motor Co., Irvington, N. J.
Crown Rheostat & Supply Co., Chicago, Ill.
Eager Electric Co., Watertown, N. Y.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.
Munning, A. P., & Co., New York-Chicago.

POLISHING MACHINES (Also see Polishing Lathes and Heads.)

Automatic

Acme Mfg. Co., Detroit, Mich.

POLISHING MATERIALS

Walter C. Gold, Philadelphia, Pa.

POLISHING MOTORS, ELECTRIC (See Polishing Lathes.)

POLISHING AND BURNISHING; JOB AND CONTRACT (See also Electro Plating.)

POLISHING AND GRINDING ENGINEERS (See Engineers.)

POLISHING WHEELS (See Buffing and Polishing Wheels.)

POLYSULPHIDE

Roessler & Hasslacher Chemical Co., New York.

POTASH

First Sorts

International Chemical Co., Philadelphia, Pa.

Real

International Chemical Co., Philadelphia, Pa.

POTASSIUM CYANIDE

Hardy, Chas., Inc., New York.
Roessler & Hasslacher Chemical Co., New York.

POWDERED METALS

Aluminum

Kemp, W. H., Co., New York.

POWDERED COAL BURNERS (See Burners.)

PRESSES (Also see Scrap Baling Machine.)

Bench and Foot

Baird Machine Co., Bridgeport, Conn.
Shuster, F. B., Co., New Haven, Conn.

Hydraulic

Watson-Stillman Co., New York.

Power, All Types

Baird Machine Co., Bridgeport, Conn.
Mackintosh-Hemphill Co., Pittsburgh, Pa.

PRESSES, DROP LIFTERS FOR

Miner & Peck Mfg. Co., Derby, Conn.

PRESSURE BLOWERS (See Blowers and Blow-Piping.)

PYROMETERS

Thwing Instrument Co., Philadelphia, Pa.

RARE METALS (See Metal Dealers.)

RECLAIMING MACHINERY, METAL (Also see Concentrating Tables; Crushers and Pulverizers; Magnetic Separators.)

Mine & Smelter Supply Co., New York.
Paxson, J. W., Co., Philadelphia, Pa.
Standard Equipment Co., New Haven, Conn.

RECORDING INSTRUMENTS

Thwing Instrument Co., Philadelphia, Pa.

RECORDING THERMOMETERS (See Thermometers.)

REFINERS AND SMELTERS (See Smelters and Refiners.)

RETORTS, GRAPHITE

Dixon, Joseph, Crucible Co., Jersey City, N. J.
McCullough-Dalzell Crucible Co., Pittsburgh, Pa.

RHEOSTATS (See also Electrical Apparatus and Equipment.)

Connecticut Dynamo & Motor Co., Irvington, N. J.
Crown Rheostat & Supply Co., Chicago, Ill.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.

RIDDLES (See Foundry Riddles.)

RIVETS, NAILS & TACKS, ALL METALS

Hasanil, John, Inc., Brooklyn, N. Y.

RODS, PISTON, TOBIN BRONZE

American Brass Co., Waterbury, Conn.

RODS AND BARS (Also see Brass Mill Products.)

Aluminum

British Aluminum Co., Ltd., New York-Toronto, Can.
Strahs Aluminum Co., New York.

Brass, Bronze and Copper

American Brass Co., Waterbury, Conn.
Conklin, T. E., Brass & Copper Co., New York.
Standard Underground Cable Co., Pittsburgh, Pa.

BUYERS' GUIDE: ADVERTISERS' PRODUCTS

ROLLING MILL MACHINERY (See also Draw Benches; Hydraulic Machinery; Presses; Rolls; Shears; Slitters.)

Blake & Johnson Company, Waterbury, Conn.

ROLLS

Chilled and Sand Iron

Mackintosh-Hemphill Co., Pittsburgh, Pa.

Jewelers'

Leiman Bros., New York.
Mackintosh-Hemphill Co., Pittsburgh, Pa.

ROLLS AND COILS (See Sheets and Strip Metal.)

Brass, Copper and Bronze

Scovill Mfg. Co., Waterbury, Conn.

ROUGE (See Buffing and Polishing Compositions.)

RUST PREVENTATIVES

International Chemical Co., Philadelphia, Pa.
Oakley Chemical Co., New York.
Parker Rust Proof Co., Detroit, Mich.

RUST PROOFING PROCESS

Parker Rust Proof Co., Detroit, Mich.

SAND

Core

U. S. Silica Co., Chicago, Ill.

Molding

Paxson, J. W., Co., Philadelphia, Pa.

For Sand Blasting

Standard Equipment Company, New Haven, Conn.
U. S. Silica Co., Chicago, Ill.

Silica

U. S. Silica Co., Chicago, Ill.

SAND BLASTS

Accessories and Supplies

Standard Equipment Company, New Haven, Conn.

Barrel

New Haven Sand Blast Co., New Haven, Conn.
Pangborn Corporation, Hagerstown, Md.
Paxson, J. W., Co., Philadelphia, Pa.
Standard Equipment Company, New Haven, Conn.

Cabinet

Astle, H. J., & Co., Providence, R. I.
Leiman Bros., New York.
Paxson, J. W., Co., Philadelphia, Pa.

Sand Blast Systems

American Foundry Equipment Co., New York.
New Haven Sand Blast Co., New Haven, Conn.
Standard Equipment Company, New Haven, Conn.

SAND BLASTS AND EQUIPMENT

American Foundry Equipment Co., New York.
Pangborn Corporation, Hagerstown, Md.

SAND MIXERS

National Engineering Co., Chicago, Ill.

SAND SIFTERS

National Engineering Co., Chicago, Ill.

SAWDUST DRYING-OUT BOXES (Also see Drying-Out Machines.)

Smith-Richardson Co., Attleboro, Mass.

SAWDUSTLESS METAL DRYERS

Tolhurst Machine Co., Troy, N. Y.

SCRAP METAL DEALERS (See Drosses, Residues, Etc., Buyers of; Turnings, Chips, Etc., Buyers of; Metal Dealers.)

SCREW MACHINE PRODUCTS (Also see Machine Products.)

Economy Machine Products Co., Chicago, Ill.

SEPARATORS, MAGNETIC (See also Magnetic Separators.)

Magnetic Mfg. Co., Milwaukee, Wis.

SHEARS (See Slitters.)

SHEEPSKIN POLISHING WHEELS

Codman, F. L. & J. C., Co., So. Boston, Mass.

SHEET FELT

American Felt Co., Boston, Mass.
Bacon Felt Co., Winchester, Mass.
Eastern Felt Co., Winchester, Mass.

SHEET METAL PIPING FOR ALL PURPOSES

No-Dust Drying Machine Co., Waterbury (Waterville Station), Conn.

SHEETS (Also see Brass Mill Products; Strip Metal.)

Aluminum

British Aluminum Co., Ltd., New York-Toronto, Canada.
Kemp, W. H., Co., New York.
Strahs Aluminum Co., New York.

Brass, Copper and Bronze

Scovill Mfg. Co., Waterbury, Conn.

Brass, Copper and Nickel Silver

American Brass Co., Waterbury, Conn.
Bristol Brass Co., Bristol, Conn.
Conklin, T. E., Brass & Copper Co., New York.
Dallas Brass & Copper Co., Chicago, Ill.
Manhattan Brass Co., New York.
New England Brass Co., Taunton, Mass.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Mfg. Co., Seymour, Conn.
Western Cartridge Co., East Alton, Ill.

Bronze

Conklin, T. E., Brass & Copper Co., New York.
New England Brass Co., Taunton, Mass.

Copper

Conklin, T. E., Brass & Copper Co., New York.
Hussey, C. G., & Co., Pittsburgh, Pa.
National Brass & Copper Co., Lisbon, Ohio.

Muntz's Metal

Taunton-New Bedford Copper Co., Taunton, Mass.

Nickel-Silver

New England Brass Co., Taunton, Mass.
Seymour Mfg. Co., Seymour, Conn.

Plated and Polished

American Nickeloid Co., Peru, Ill.
National Sheet Metal Co., Peru, Ill.

Platinum

Roessler & Hasslacher Chemical Co., New York.

Silver, Sterling

Handy & Harman, New York.
Jackson, John J., Co., Newark, N. J.

Zinc

Illinois Zinc Co., Peru, Ill.
Matthiessen & Hegeler Zinc Co., La Salle, Ill.
New Jersey Zinc Sales Co., New York.

SILICA, PULVERIZED

U. S. Silica Co., Chicago, Ill.

SILICA SAND

U. S. Silica Co., Chicago, Ill.

SILICON COPPER

Ajax Metal Company, Philadelphia, Pa.
Alloys & Products, Inc., New York.
Electric Smelting & Aluminum Co., Lockport, N. Y.

Boronic

American Boron Products Co., Reading, Pa.

SILVER (See Smelters and Refiners; Anodes Bars; Castings; Ingots; Metal Dealers; Sheets; Solder; Etc.)

SILVER, BORONIC

American Boron Products Co., Reading, Pa.

SILVER CYANIDE

Middlesex Aniline Co., Lincoln, N. J.
Roessler & Hasslacher Chemical Co., New York.

SLAB ZINC

Hegeler Zinc Co., Danville, Ill.
Illinois Zinc Co., Peru, Ill.
Matthiessen & Hegeler Zinc Co., La Salle, Ill.
New Jersey Zinc Sales Co., New York.
Tottenville Copper Co., Inc., Tottenville, N. Y.

SLAG CRUSHERS (See Crushers and Pulverizers.)

SLITTERS, SHEET METAL (See Shears.)

SLITTING MACHINES

Blake & Johnson Company, Waterbury, Conn.

SMELTERS AND REFINERS (Also see Ingots.)

Copper-Bearing Material

Ajax Metal Company, Philadelphia, Pa.
Capper, Pass & Son, Ltd., Bristol, England.
Tottenville Copper Co., Inc., Tottenville, N. Y.
Whipple & Choate Company, Bridgeport, Conn.

Gold

Handy & Harman, New York.

Platinum

Roessler & Hasslacher Chemical Co., New York.

Silver

Handy & Harman, New York.

White Metals

Michigan Smelting & Refining Co., Detroit, Mich.

Zinc

New Jersey Zinc Sales Co., New York.

SOAP AND SOAP CHIPS

American Tripoli Co., Seneca, Mo.
Greasalt Products Co., New York.
International Chemical Co., Philadelphia, Pa.

SODA ASH

Roessler & Hasslacher Chemical Co., New York.

SODIUM CYANIDE

American Cyanamid Co., New York.
Hanson & Van Winkle Co., Newark, N. J.
Hardy, Chas., Inc., New York.
Kyle, Geo. W., Company, New York.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.
Roessler & Hasslacher Chemical Co., New York.

SOLDER

Tinners

Michigan Smelting & Refining Co., Detroit, Mich.
Niagara Falls Smelting & Refining Corp., Buffalo, N. Y.

SOLDER MOLDS (See Molds.)

SOLDERING FLUX (See Fluxes.)

SOLDERING, ZINC

New Jersey Zinc Sales Co., New York.

SOLUTIONS, OXIDIZING

Sulphur Products Co., Greensburg, Pa.

SOLVENTS

Anderson Chemical Co., New York.
Celluloid Zapon Co., New York.
Commercial Solvents Corp., Terre Haute, Ind.
Egyptian Lacquer Mfg. Co., New York.
Zeller Lacquer Mfg. Co., New York.

SPECIALTIES, METAL (See Wire Specialties; Wire Shapers and Forms; Metal Goods Made to Order.)

SPELTER (See Slab Zinc; also see Ingots.)

SPELTER SOLDER (See Solder Brazing.)

SPINNING METAL

Stuart-Oliver Metal Spinning Co., Rochester, N. Y.

SPINNING CHUCKS (See Chucks.)

SPINNING LATHES (See also Lathes.)

Pryibil, P., Machine Co., New York.

BUYERS' GUIDE: ADVERTISERS' PRODUCTS

SPRAYERS

Foundry

DeVilbiss Mfg. Co., Toledo, Ohio.

Lacquer, Enamel, Japan, Paint

De Vilbiss Mfg. Co., Toledo, Ohio.
Economy Machine Products Co., Chicago, Ill.
Eureka Pneumatic Spray Co., Richmond Hill, N. Y.
Ideal Air Brush Mfg. Co., New York.

SPRAYING ACCESSORIES, HOODS, TABLES, ETC.

DeVilbiss Mfg. Co., Toledo, Ohio.
Ideal Air Brush Mfg. Co., New York.

SPRAYING EQUIPMENT, PORTABLE

De Vilbiss Mfg. Co., Toledo, Ohio.
Ideal Air Brush Mfg. Co., New York.

SPRUE CUTTERS (See also Saws.)

Shuster, F. B., New Haven, Conn.

STAMPING AND DRAWING, JOB AND CONTRACT (Also see Metal Goods Made to Order.)

Scovill Mfg. Co., Waterbury, Conn.
Western Cartridge Co., East Alton, Ill.

STEAM SUPERHEATERS

Babcock & Wilcox Co., New York.

STEEL BALLS FOR BURNISHING BARRELS

Abbott Ball Co., Hartford, Conn.
Baird Machine Co., Bridgeport, Conn.
Crown Rheostat & Supply Co., Chicago, Ill.
Hanson & Van Winkle Co., Newark, N. J.
No-Dust Drying Machine Co., Waterbury (Waterville Station), Conn.
Smith-Richardson Co., Attlebore, Mass.

STEEL, BORONIC

American Boron Products Co., Reading, Pa.

STIRRERS (See Graphic Products.)

STOKERS, CHAIN GRATE

Babcock & Wilcox Co., New York.

STONEWARE, ACID-PROOF (See Acid Pumps; Dipping Baskets.)

STRAIGHTENING, CUTTING AND FORMING MACHINERY (See Cutting, Straightening and Forming Machinery.)

STRIP METAL IN COILS AND ROLLS (Also see Brass Mill Products.)

Brass, Copper and Nickel Silver

New England Brass Co., Taunton, Mass.

Copper

National Brass & Copper Co., Lisbon, Ohio.

Zinc

New Jersey Zinc Sales Co., New York.

SULPHATE OF ALUMINUM

Roessler & Hasslacher Chemical Co., New York.

SULPHOCYANIDE OF SODA

Roessler & Hasslacher Chemical Co., New York.

SWEEP SMELTERS (See Smelters and Refiners.)

SWITCHBOARDS (See also Electrical Apparatus and Equipment.)

SYPHON VENTILATING CABINET

Grand Rapids Blow Pipe & Dust Arrester Co., Grand Rapids, Mich.

TANKS

Lead Lined

Abernethy, John F., Brooklyn, N. Y.
Chemical Lead Burning Co., Brooklyn, N. Y.
Koven, L. O., & Bro., Jersey City, N. J.

Steel

Kirk & Blum Mfg. Co., Cincinnati, Ohio.
Koven, L. O., & Bro., Jersey City, N. J.

Wood

Corcoran, A. J., & Co., Jersey City, N. J.
Hauser-Stander Tank Co., Cincinnati, Ohio.
Kalamazoo Tank and Silo Co., Kalamazoo, Mich.
Meaker Galvanizing Co., Chicago, Ill.
Mine & Smelter Supply Co., New York.
Munning, A. P., & Co., New York-Chicago.
Stearns, A. T., Lumber Co., Boston, Mass.
U. S. Galvanizing & Plating Equipment Corp., Brooklyn, N. Y.

TESTING LABORATORIES (See also Assayers and Chemists.)

Chemical

New York Testing Laboratories, New York.
Pitkin, Lucius, Inc., New York.

TIN; PIG, BAR and BLOCK (See also Ingots, Tin.)

TINNING (See Electro-Plating, Hot Galvanizing and Tinning.)

TINNING FURNACES (See Galvanizing and Tinning Furnaces.)

TINNING FLUXES (See Fluxes.)

TOOL HARDENING FURNACES (See Heat Treating Furnaces.)

TRIPOLI COMPOSITION

Harshaw, Fuller, & Goodwin Co., Philadelphia, Pa.

TRIPOLI, LUMP AND GROUND

American Tripoli Co., Seneca, Mo.

TUBES (Also see Brass Mill Products.)

Brass, Bronze and Copper

American Brass Co., Waterbury, Conn.
Conklin, T. E., Brass & Copper Co., New York.
Standard Underground Cable Co., Pittsburgh, Pa.

Condenser

Scovill Mfg. Co., Waterbury, Conn.

TUMBLING BARRELS (Also see Burnishing and Polishing Barrels; Plating Barrels.)

All Kinds

Baird Machine Co., Bridgeport, Conn.
Globe Machine & Stamping Co., Cleveland, Ohio.
Henderson Bros. Co., Waterbury, Conn.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.

Foundry

Baird Machine Co., Bridgeport, Conn.
Globe Machine & Stamping Co., Cleveland, Ohio.
Henderson Bros. Co., Waterbury, Conn.

Japanning

Baird Machine Co., Bridgeport, Conn.

Lacquering

Baird Machine Co., Bridgeport, Conn.

Oblique

Baird Machine Co., Bridgeport, Conn.
Henderson Bros. Co., Waterbury, Conn.

TUNGSTEN

Metal & Thermit Corp., New York.

TURNINGS, CHIPS, ETC., BUYERS OF (Also see Drosses, Residues, Etc., Buyers of; Metal Dealers.)

TYPE METAL (See Ingots.)

VACUUM PUMPS, ROTARY

Leiman Bros., New York.

VARNISHES FOR ALL PURPOSES

Hilo Varnish Corp., Brooklyn, N. Y.

VENTILATING SYSTEMS (See Blowers and Blow Piping; Dust Collectors and Ventilating Systems; Exhaust Fans and Heads.)

VIENNA LIME COMPOSITION

Harshaw, Fuller, & Goodwin Co., Philadelphia, Pa.

VOLTMETERS (Also see Electrical Apparatus and Equipment.)

Connecticut Dynamo & Motor Co., Irvington, N. J.

WASHING MACHINE, METAL PARTS

No-Dust Drying Machine Co., Waterbury (Waterville Station), Conn.

WASTE CLEANER AND OIL RECLAIMER

International Chemical Co., Philadelphia, Pa.
Oakley Chemical Co., New York.

WEIGHERS AND SAMPLERS

Pitkin, Lucius, Inc., New York.

WHALE OIL SOAP (Also see Cleaning Compounds; Fig Cleansers.)

International Chemical Co., Philadelphia, Pa.

WHITE METALS (See also Smelters and Refiners; Babbitt Metal; Ingots.; Etc.)

Ajax Metal Company, Philadelphia, Pa.
Tottenville Copper Co., Inc., Tottenville, N. Y.

WHITE POLISH

Harshaw, Fuller, & Goodwin Co., Philadelphia, Pa.

WILFLEY TABLES

Mine & Smelter Supply Co., New York.

WIRE

Aluminum

British Aluminum Co., tLd., New York-Toronto, Canada.

Brass, Bronze, Copper and Nickel-Silver, Etc.

American Brass Co., Waterbury, Conn.
Conklin, T. E., Brass & Copper Co., New York.

Zinc

New Jersey Zinc Sales Co., New York.

WIRE FORMING MACHINERY (See also Cutting, Straightening and Forming Machinery.)

Baird Machine Co., Bridgeport, Conn.

WIRE MILL PRODUCTS (See Brass Mill Products; Wire.)

WIRE STRAIGHTENING AND CUTTING MACHINERY (See Cutting, Straightening and Forming Machinery.)

WIRE WHEEL BRUSHES (See Brushes.)

WIRING DEVICES (See Electrical Apparatus and Equipment.)

WOOD ENAMELS (See Enamels.)

WOOD LACQUERS (See Lacquers.)

WOODFILLERS, PASTE

Hilo Varnish Corp., Brooklyn, N. Y.

YELLOW BRASS (See Sheets, Munts's Metal.)

ZINC (See Slab Zinc; Smelters and Refiners; Anodes; Sheets; Strip Metal, Etc.)

ZINC CYANIDE

American Cyanamid Co., New York.
Hardy, Chas., Inc., New York.
Middlesex Aniline Co., Lincoln, N. J.
Roessler & Hasslacher Chemical Co., New York.

ZINC DUST

New Jersey Zinc Sales Co., New York.

ZINC ELECTROLYTIC

United Metals Selling Co., New York.

ZINC PLATING (See Electro-Galvanizing.)

ZINC PRODUCTS

New Jersey Zinc Sales Co., New York.

ZINC, ROLLED (Also see Sheets, Zinc.)

New Jersey Zinc Sales Co., New York.
Platt Bros. & Co., Waterbury, Conn.

ZINC SALTS, COMMERCIAL

Meaker Galvanizing Co., Chicago, Ill.
U. S. Galvanizing and Plating Equipment Corp., Brooklyn, N. Y.

ALPHABETICAL INDEX OF ADVERTISEMENTS

A

Page

Abbott Ball Co., Hartford, Conn..... 25
Abernethy, John F., Brooklyn, N. Y..... 17
Abrasive Co., Bridesburg, Philadelphia, Pa.... 23
Acme Mfg. Co., Detroit, Mich..... 21
Ajax Metal Co., Philadelphia, Pa..... 72
American Boron Products Co., Reading, Pa.... 6
American Brass Co., Waterbury, Conn..... 53
American Cyanamid Co., New York..... 19
American Felt Company, Boston, Mass..... 33
American Foundry Equipment Co., New York.. 13
American Nickeloid Co., Peru, Ill..... 55
American Tripoli Co., Seneca, Mo..... 20
Anaconda Copper Mining Co., New York..... 57
Andersen, Alfred, New York 59
Anderson Chemical Co., New York 46
Anthony, H. M., Co., New York..... 19
Armstrong Cork & Insulation Co., Pittsburgh, Pa. 5
Astle, H. J., & Co., Providence, R. I. 22

B

Babcock & Wilcox Co., New York..... 16
Bacon Felt Co., Winchester, Mass..... 1
Baird Machine Co., Bridgeport, Conn..... 15
Balbach Smelting & Refining Co., New York. 50 and 58
Baltimore Brass Co., Baltimore, Md..... 56
Barker Bros., Inc., Brooklyn, N. Y. 20
Bartley, Jonathan, Crucible Co., Trenton, N. J. 10
Belmont Smelting & Refining Works, Brooklyn, N. Y. 58
Belyea Company, New York 60
Bennett-O'Connell Co., Chicago, Ill. 27
Blake & Johnson Company, Waterbury, Conn.. 14
Blumenthal, H., & Co., New York 17
Bogue, Chas. J., Electric Co., New York..... 17
Bristol Brass Co., Bristol, Conn..... 56
British Aluminum Co., Ltd., New York-Toronto, Can. 72
Buchanan, Thos., Co., Cincinnati, Ohio..... 28
Buckeye Products Co., Cincinnati, Ohio..... 10
Burns, E. Reed, Mfg. Corp., Brooklyn, N. Y... 24
Byrd, R. E., Erie, Pa. 16

C

Cambridge Novelty Co., Cambridge, Mass..... 50
Campbell-Hausfeld Co., Harrison, Ohio..... 12
Capper Pass & Son, Ltd., Bristol, England..... 58
Celluloid Zapon Co., New York 46
Chemical Lead Burning Co., Brooklyn, N. Y... 16
Cleveland Armature Works, Cleveland, Ohio.... 20
Cleveland Blow Pipe & Mfg. Co., Cleveland, O. 23
Codman, F. L. & J. C., Co., Boston, Mass.... 29
Commercial Solvents Corp., Terre Haute, Ind.. 26
Conklin, T. E., Brass & Copper Co., New York. 54
Connecticut Dynamo & Motor Co., Irvington, N. J. 27
Corcoran, A. J., Inc., Jersey City, N. J..... 22
Coriiss Carbon Co., Bradford, Pa..... 17
Cowles Detergent Co., Lockport, N. Y. 31
Crown Rheostat & Supply Co., Chicago, Ill.... 37

D

Dallas Brass & Copper Co., Chicago, Ill..... 56
Daniels & Orben Co., Inc., New York..... 33
Detroit Electric Furnace Co., Detroit, Mich.... 4
De Vilbiss Mfg. Co., Toledo, O..... 45
Divine Bros. Co., Utica, N. Y. 29
Dixon, Jos., Crucible Co., Jersey City, N. J..... 8

E

Eager Electriv Co., Watertown, N. Y. 24
Eastern Felt Co., Winchester, Mass..... 36
Economy Machine Products Co., Chicago, Ill.... 25
Egyptian Lacquer Mfg. Co., New York 2
Electric Smelting & Aluminum Co., Lockport, N. Y. 72
Ely Anode & Supply Co., New York 34
Enz Anton, New York 59
Eureka Pneumatic Spray Co., Richmond Hill, N. Y. 45

F

Fanning, J. P., Co., Brooklyn, N. Y. 16
Felek, Julius, New York 58
Ford, J. B., & Co., Wyandotte, Mich..... 32
Fuerst Friedman Co., Cleveland, Ohio..... 60
Fuller, W. A., Company, Greensburg, Pa..... 17

G

Page

General Abrasive Co., Niagara Falls, N. Y..... 23
General Ceramics Co., New York 18
General Chemical Co., Philadelphia, Pa..... 16
Globe Machine & Stamping Co., Cleveland, O... 25
Gold, Walter C., Philadelphia, Pa..... 20
Grand Rapids Blow Pipe & Dust Arrestor Co., Grand Rapids, Mich. 18
Greasalt Products Corp., New York 33
Guaranteed Buff Co., New York 28

H

Handy & Harman, New York 49
Hanson & Van Winkle Co., Newark, N. J..... 41
Hardy, Chas., Inc., New York 26
Harshaw, Fuller & Goodwin Co., Cleveland, O.. 34
Hassall, John, Inc., Brooklyn, N. Y. 19
Hauser-Stander Tank Co., Cincinnati, Ohio.... 18
Hawley Down Draft Furnace Co., Easton, Pa.. 9
Hegeler Zinc Co., Danville, Ill..... 57
Henderson Bros. Co., Waterbury, Conn..... 28
Hendricks Bros., New York 57
Hilo Varnish Corp., Brooklyn, N. Y. 49
Holland, J., & Sons, Brooklyn, N. Y..... 60
Hussey, C. G., & Co., Pittsburgh, Pa..... 56

I

Ideal Air Brush Co., New York 45
Illinois Zinc Co., Peru, Ill..... 57
International Chemical Co., Philadelphia, Pa... 74

J

Jackson Co., John J., Newark, N. J. 56
Jantz & Leist Electric Co., Cincinnati, O..... 19
Johnson Gas Appliance Co., Cedar Rapids, Ia... 8
Johnson Mfg. Co., Chicago, Ill:..... 16

K

Kalamazoo Tank & Silo Co., Kalamazoo, Mich.. 22
Kay & Ess Co., Dayton, Ohio..... 25
Kemp, W. H., Co., New York 55
Kenworthy, Chas. F., Inc., Waterbury, Conn... 13
Kirk & Blum Mfg. Co., Cincinnati, O..... 23
Koven, L. O., & Bro., Jersey City, N. J..... 9
Kyle, George W., & Co., Inc., New York..... 24

L

Lasalco, Inc., St. Louis, Mo..... 50
Lava Crucible Co. of Pittsburgh, Pittsburgh, Pa. 10
Leavitt, C. W., & Co., New York..... 58
Lehman Bros., Hoboken, N. J. 55
Leiman Bros., New York 23
L'Hommedieu, Chas. F., & Sons, Co., Chicago, Ill. 30
Light Mfg. & Foundry Co., Pottstown, Pa..... 59
Linfante, J. L., Jersey City, N. J. 17
Loeble, Charles F., Philadelphia, Pa..... 59

M

Maas & Waldstein Co., New York 46
MacDermid, Inc., Waterbury, Conn..... 32
Mackintosh-Hemphill Co., Pittsburgh, Pa..... 14
Magnetic Mfg. Co., Milwaukee, Wis..... 16
Magnus Chemical Co., Brooklyn, N. Y. 17
Magnuson Products Corp., Brooklyn, N. Y..... 26
Manhattan Brass Co., New York 56
Matchless Metal Polish Co., Chicago and Glen Ridge, N. J. 26
Matthiesen & Hegeler Zinc Co., La Salle, Ill.. 57
McCullough-Dalzell Crucible Co., Pittsburgh, Pa. 9
Meaker Galvanizing Co., Chicago, Ill..... 38
Mercil, B., & Sons, Plating Co., Chicago, Ill... 19
Metal & Thermit Corp., New York..... 72
Michigan Smelting & Refining Co., Detroit, Mich. 54
Middlesex Aniline Co., Lincoln, N. J. 42
Mine & Smelter Supply Co., New York 7
Miner & Peck Mfg. Co., Derby, Conn..... 12
Monarch Engineering & Mfg. Co., Baltimore, Md. 3
Mosso, C. A., Laboratories, Chicago, Ill..... 17
Munning, A. P., & Co., New York-Chicago.... 39

N

Page

Nassau Smelting & Rfg. Works, New York... 58
National Brass & Copper Co., Lisbon, Ohio.... 56
National Engineering Co., Chicago, Ill..... 13
Naugatuck Valley Crucible Co., Shelton, Conn.. 73
New England Brass Co., Taunton, Mass..... 54
New Haven Sand Blast Co., New Haven, Conn. 16
New Jersey Zinc Sales Co., New York 51
New York Testing Laboratories, New York.... 59
Niagara Falls Smelting & Refining Corp., Buffalo, N. Y. 55
Nikolas, G. J., & Co., Chicago, Ill..... 43
No-Dust Drying Machine Co., Waterbury, Conn. 28

O

Oakley Chemical Co., New York 31
Oden Corp., College Point, L. I., N. Y..... 17
Ohio Buff & Mfg. Co., Cincinnati, O..... 18

P

Pangborn Corporation, Hagerstown, Md. 16
Parker Rust-Proof Co., Detroit, Mich..... 48
Paxson, J. W., Co., Philadelphia, Pa..... 12
Pitkin, Lucius, Inc., New York 69
Platt Bros. & Co., The, Waterbury, Conn..... 56
Pryibil, P., Machine Co., New York 14

Q

Quigley Furnace Specialties Co., Inc., New York 13

R

Radnai, Josef, New York 58
Rausch Mfg. Co., Racine, Wis..... 22
Richter, Emil, Crottendorf, Germany..... 58
Rockwell, W. S., Co., New York 8
Roessler & Hasslacher Chemical Co., New York 40
Rohmer, Gabriel E., New York 59
Ross-Tacony Crucible Co., Tacony, Philadelphia, Pa. 16

S

Schweizer, Chas. K., St. Louis, Mo..... 16
Scovill Mfg. Co., Waterbury, Conn..... 52
Seidel, R. B., Inc., Philadelphia, Pa..... 11
Seymour Mfg. Co., Seymour, Conn..... 21
Shuster, F. B., Co., New Haven, Conn..... 18
Smith-Richardson Co., Attleboro, Mass..... 24
Standard Equipment Co., New Haven, Conn.... 9
Standard Rolling Mills, Inc., Brooklyn, N. Y.. 57
Standard Underground Cable Co., Pittsburgh, Pa. 56
Steiner, E. E., & Co., Newark, N. J..... 11
Sterling Art Metal Works, New York..... 59
Stevens, Frederic B., Detroit, Mich..... 44
Strahs Aluminum Co., New York 55
Stuart-Oliver Metal Spinning Co., Rochester, N. Y. 59
Sulphur Products Co., Greensburg, Pa.....35 and 17
Surface Combustion Co., New York 16

T

Taunton-New Bedford Copper Co., New Bedford, Mass. 56
Thwing Instrument Co., Philadelphia, Pa..... 11
Tolhurst Machine Works, Troy, N. Y. 22
Tottenville Copper Co., Inc., Tottenville, N. Y. 73
Trotter & Co., Nathan, Philadelphia, Pa..... 58
Turner Machine Co., Philadelphia, Pa..... 14

U

United Metals Selling Co., New York..... 57
U. S. Galvanizing & Plating Equipment Corp., Brooklyn, N. Y. 35
U. S. Silica Company, Chicago, Ill..... 11

W

Watson-Stillman Co., New York 12
Waukegan Chemical Co., Waukegan, Ill..... 47
Western Cartridge Co., Alton, Ill..... 54
Whipple & Choate Co., Bridgeport, Conn..... 58

Z

Zeller Lacquer Manufacturing Company, Inc. New York 48

FOR INDEX TO ADVERTISERS, SEE PAGE 71